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MINING AND SCIENTIFIC PRESS

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SAN FRANCISCO, SATURDAY, JULY 6, 1901.

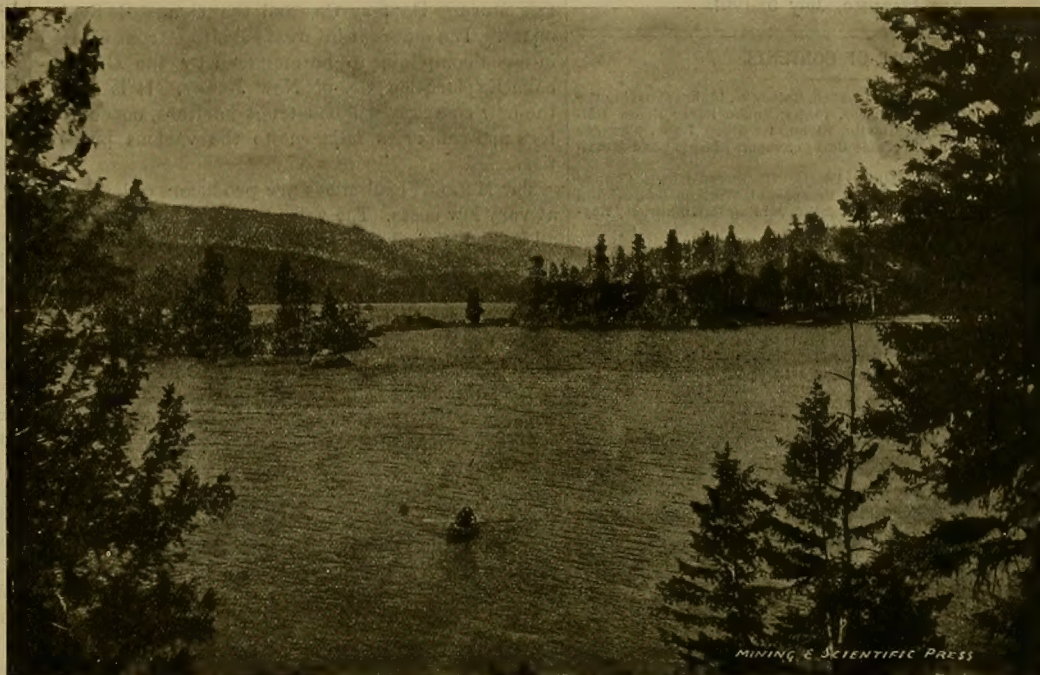
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A Scenic Mining District.

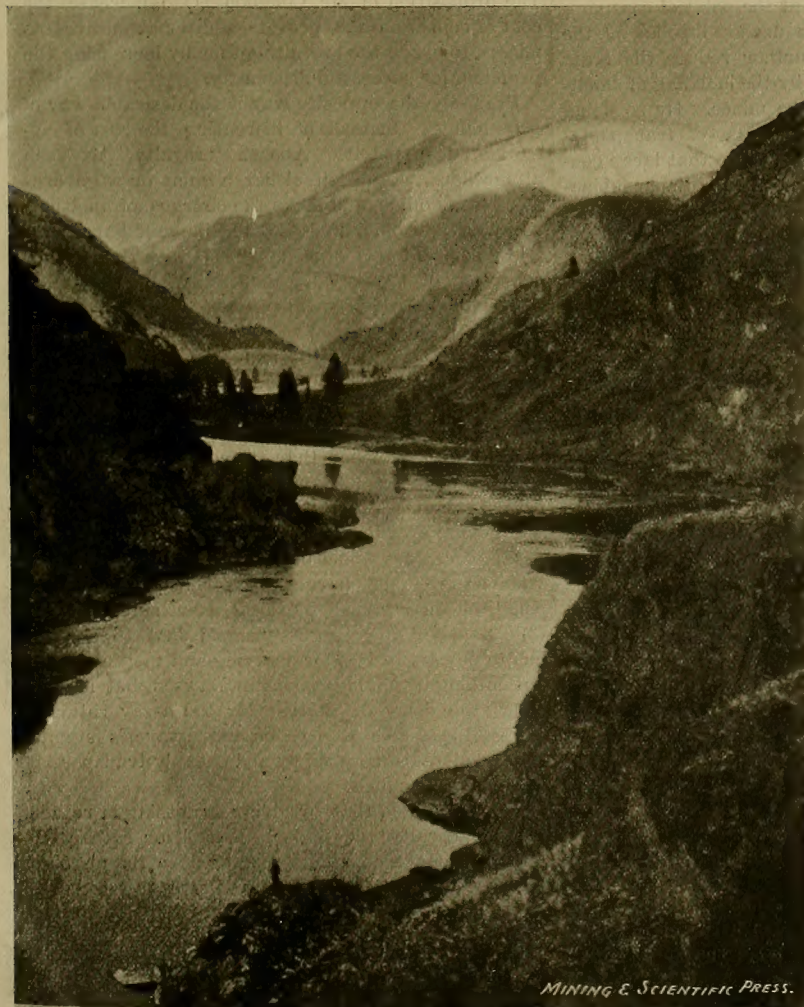
Central Idaho is typical of many localities that possess attractive, charming scenery that would have remained inaccessible, if not, indeed, unknown, but for the discovery of dormant resources of mineral wealth.

The illustrations on this page and on page 4 are glimpses of a scenic paradise in the heart of a rich mining region just beginning to yield to mining exploitation. The Seven Devils country and the basin of Salmon river are rugged and mountainous enough, are sufficiently remote from settlement and sufficiently devoid of all the natural facilities for mining to satisfy the most exacting of the old prospectors that it is a good country to prospect in, a good country for good mines. So it has been during the past few years, since the advancing fringe of settlement pushed the pioneer prospectors forward into it. Buffalo Hump and Seven Devils have been discoveries from which prospectors drew down good rewards for pioneering an attractive wilderness.

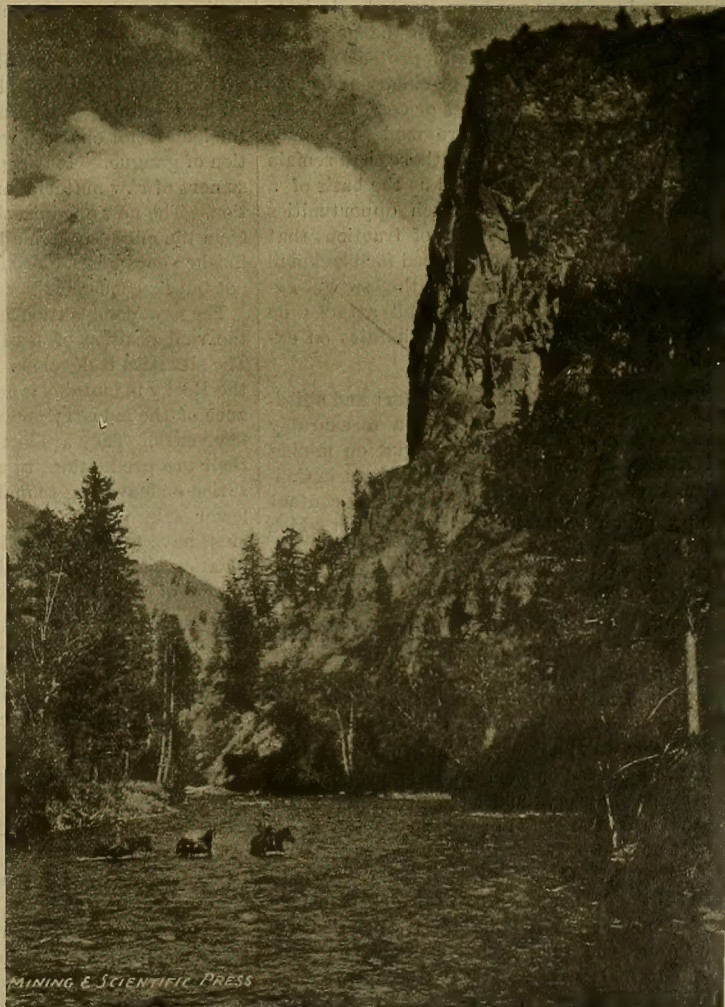
Now that the way is broken and roads built by the miners, the country is found to have additional possibilities of wealth production from grand natural scenic attractions. Hotels and summer homes, and the facilities that attend on social life will in turn aid to the more complete discovery and exploitation of the mineral wealth hidden beneath the scenery.



Payette Lakes, Boise Co., Idaho.



Crossing the Middle Fork of Salmon River, Idaho.



Snake River Below Ballards Landing, Seven Devils, Idaho.

MINING AND SCIENTIFIC PRESS.

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In suggesting to the Mining Congress, which meets this month at Boise, the desirability of action toward securing such a change in the U. S. Mining Statutes that subsequent lode locations shall not have extralateral rights, this paper believes that there is no reason to the contrary in the fact that such rights have been vested in all existing locations and in existing mining patents. It is recognized that these vested rights cannot be altered nor can their claimants be dispossessed of them. But it is submitted that all the possible mines in the public lands of the United States have not been discovered and have not been located. It is to protect the discoverers of these from the perpetual threat of litigation and the costs of protection from it. As the law is now, locations of claims are made that do not cover the apex of lodes or conform to the plain intent of the law. They are made to secure such an area of surface ground that there shall remain nothing vacant that can be located as the basis of a blackmailing suit. The use of such opportunities is openly recognized by the location of fractions that have no value as mines, but can be used for blackmail of bona fide mining. The change in the law will destroy the possibility of such blackmail attacks on future locations and minimize the possibilities on existing mines.

AFTER twenty years of persistent effort and agitation there is at the present time a measurably near-by prospect of work being begun on mining debris restraining barriers in the Yuba river in California. The Government officials coming in contact with the problem have finally grasped the fact which makes the construction of such restraining works a necessity. They now see that it is not simply a matter of providing for the storage of debris from continued mining, the restoration of the hydraulic mining industry, but is more importantly the holding back in the mountains of the vast mass of mining debris deposited in the mountain canyons from the mining of the thirty years prior to 1880. This vital fact of necessity was just as much in evidence in 1880 as it is now, and acted on then as it is proposed to now, restraining works would have prevented much damage that has been done in the interval and much that cannot now be prevented by the present construction of works. During the twenty years fully two-thirds of the accumulated mass of debris in 1880 above the proposed site of restraining works is now below the site. The works would have cost no more then than now and they would have held this mass back and saved their cost in the interval. Incidentally there would have been an enormous output of gold from the hydraulic industry that has been closed

down in the interval. It is to be hoped that now that the Government officially knows the urgency and necessity of the debris restraining works that construction will be hastened and extended. There is debris in other rivers that should not be permitted to work below the possible sites of restraining works.

A Lead Mining Combination.

In continuation of the logical development of consolidation following on the formation of the American Smelting & Refining Co., the telegraph reports the organization in New York of a lead combination, capitalized at \$20,000,000, to control the output of the lead mines in Missouri. Among the properties mentioned as included are the Guggenheim Exploration Co., the Standard Oil lead mines, the Whitney-Ryan holdings, the Union Lead & Oil Co., the Electric Storage Battery Co. and the Grant B. Schley mines. The different interests are to be consolidated into one company, to be managed by the Guggenheim Exploration Co. of New Jersey. It is stated the new company will construct smelters, concentrators and refineries adjacent to the various properties.

The Missouri lead mines are producers of lead ores at very low costs. The value of the ore is practically all in lead, the silver content being low. Still the low costs of mining and low transportation charges make them safely profit-earning with a market price for lead so low that it would close down many lead-silver mines in Colorado or Idaho. The properties named as going in the combination are only a minor fraction of the total mines, but aggregated and in control of the smelting, transportation, marketing and consuming agencies the combination will be a dominating fraction.

The significance of the interests mentioned is in their visible identity with the interests that constitute the American Smelting & Refining Co., the smelter trust. It shows as actually occurring what this paper predicted three months since would be inevitable. The smelter combination is owning the mines. The difference between ownership and business control is in this latest reported action a difference of name with no difference of fact. The ownership so far developed is of the mines capable of producing the cheapest metal at the point of consumption. It is notable that the declared policy of the new combination is to still further reduce the costs at the point of consumption by the building of smelting and refining works at the mines. By so doing the lead is not charged with the cost of transportation of gangue. It is significant also that large consumers of raw material are included in the combination. The new organization proposes to control lead from the mine through all intermediate stages to the finished consumable product. Such production can not but be economical.

The new combination is a business recognition of the real position of lead as stated by this paper. The situation it develops for the lead-silver miners of the Rocky mountains is not encouraging to a continuance of the industry under the conditions of the last few years. They are in the position of having to sell their ore productions to a competing mining organization endeavoring to maintain profits in the face of lower sale prices. The Missouri lead production must have the profit that was the incentive to combination, if it has to take it from the silver-lead miners of the Rocky mountains.

The means adopted to secure these profits are commercial, and it must be recognized that they represent the most perfect art of business exploitation of an industry. The lead smelting agencies, to secure the profits, have become miners of lead in Missouri. The lead-silver miners must become smelters of lead in the Rocky mountains if they would continue to hold the profits the others are proposing to take.

THERE does not appear to be any hurry on the part of capital to take advantage of the Canadian bounty on lead refining. With all due allowance for reasonable conservatism of action with reference to large undertakings, there seems a reluctance to take the risk involved with lead in its present commercial position despite the bounty of \$5 a ton. It would appear as if the bounty was not regarded as an insurance of profit for the business.

Royalty on Klondike Gold.

The Yukon Council is in receipt of some more advice as to how not to do it in the collecting of the royalty, some of which is believed to escape. Mr. F. T. Congdon, the legal adviser of the Council, has suggested to it that the Government establish a purchasing office and compel all mine owners to sell their gold dust to the office. Details are provisions permitting laborers to file liens for disputed wages claims against the gold in the hands of the purchasing official, who will then hold it pending the operation of the court on the lien; providing that the miner could not receive pay (less royalty) for his gold till ten days had elapsed to give the laborer his chance; inspectors would be maintained at the mines to see that the product of the claims was all turned in, and other inspectors at the boundaries would enforce the turning in of any gold that escaped the other set. The export of gold dust would be prohibited except by the Government, and payment would be made in Canadian money, which makes another shave.

The idea may be new to its proponent, but it is so singularly like the Russian law controlling the same matter that it is old to other people. In Russia gold must be sold only to the Government, which takes out its royalty and pays for it in paper roubles. Government mining engineers are kept at the mines, who receive the gold and forward it to Irkutsk, where it is bought and then paid for. The differences are in names only, the essentials are identical. In Russia, Chinese gold buyers give spot cash for gold and pay a higher price than the Government. As a consequence they get large amounts, which they smuggle into China. The Russian Government does not pay its mining engineers very large salaries.

Something more modern is looked for from Canada than the copying of Russian administrative methods. That the regulations described are seriously proposed cannot be ascribed to ignorance of a business way of accomplishing the desired result. What is wanted by the Canadian Government is that the gold mining industry should contribute enough gold (5% of the total is considered sufficient) to pay for the government of the people dependent on the business and the cost of collection. What the gold miners want is to pay as little of the gold as possible. The proposition of Mr. Congdon is to increase the cost of collection and provide additional motives to miners to evade the law altogether by increasing the premium for successful dishonesty.

Precisely the opposite way is the desirable way of proceeding. Instead of increasing the cost of collection, decrease it. Abolish "royalty" as such altogether. Establish either a mint or a government assay office, and make the charges of melting, assaying and officially stamping the gold bars 5% or a less per cent. It is probable that with the costs of collection of the royalty deducted that the other governmental requirements of taxation could be met with 4%.

The advantages to the miner which would induce him to bring his gold in to the assay office would be: (1) He would save the commercial shave that is made by trade payment for gold dust by the stores at about \$1 less an ounce than its coinage value. This shave ranges from 3% to 6% dependent on the success of the merchant in avoiding being defrauded in the buying by wilful impairment of quality. (2) The assay office bars would become worth their coinage value less refining charges on which no advantage could be maintained by local merchant buyers. (3) The miner when he gets his gold dust to Seattle has to pay 1% to 1½% for assaying and melting, so is out nothing by having it done at Dawson, but in fact saves the delay of waiting for the assay returns. His gold is salable at once on the assayer's stamp. (4) His metal is more safely and cheaply transported in bars than as dust.

It will be noted that by giving something in return for the royalty the Yukon Council, or rather the Canadian Government, will so reduce the profit of successful dishonesty that it will no longer overbalance the risk of loss from being caught.

THE reports of dividend payments made during the first six months of 1901 indicate that mining, including the separate smelting and treatment operations dependent on it, is the most profitable of all the industries.

Concentrates.

GOLD, silver and copper have the same hardness as calcspar.

WHERE combination is possible, competition is impossible.

THERE is no advantage gained by increasing the width of a belt to prevent its slipping on the pulleys.

NEW COPPER PLATES will absorb gold at about the rate of one-half pennyweight to each ton of ore milled.

A THIN coating of scale on the wet side of a boiler plate affects the steaming capacity less than a furring of soot on the fireside.

THE No. 5 shaft at the Tamarack, Mich., copper mine is over 4900 feet deep and cost \$633,598, or about \$130 per foot, including the surface equipment.

LOCATORS AND OWNERS of unpatented mining claims on forest reservation lands must get a permit to cut timber on the mining claims for mining use.

IN California a miner's inch of water is defined by statute to be equivalent to $1\frac{1}{4}$ cubic feet of water per minute, measured through any aperture or orifice.

FOR burning in its crude state, oil should be of a gravity of about 14 to insure the best results, there being more heat units in such oil than in the lighter grades.

THE State of Colorado produced in gold and silver in 1900 coinage values of \$41,250,811, which gives it the first place in comparison with other States and foreign countries.

THE latest report of the Anaconda M. Co., Butte, Mont., states the cost for mining during the year 1900 was \$3.97 a ton, and for smelting, refining and treatment charges generally \$4.14 a ton.

A LARGE BOILER will make more steam per pound of fuel than a small one, but there is a limit, and the interest on the extra cost of the large boiler can exceed the extra cost of fuel and maintenance of the small boiler.

THE Cariboo Con. Hy. M. Co. has sent a gold brick, weighing 1000 pounds and containing approximately \$200,000, to the Glasgow Exposition. It is the cleanup of the first run of the season at the mine at Bullion, B. C.

CHILE produces about 25,000 tons copper annually. The most of the ore is exported, and the Chilean copper plants are mostly idle. Inadequate transportation is the chief cause of the depression there of the copper industry.

A BOILER 48 inches diameter, 14 feet long, 50 3-inch tubes, contains 677 square feet effective heating surface. The grates might be 4 feet 8 inches wide by 3 feet 6 inches deep; the boiler would be about 60 indicated horse power.

QUARTZ ground to pass through No. 30 screen will weigh ninety-nine pounds to the cubic foot; ground to pass No. 60 screen, ninety-eight pounds to the cubic foot; ground to pass No. 100 screen, ninety-four pounds to the cubic foot.

THE claim is made that there is possible a considerable economy in operating the separate machines of a sawmill with electric motors, over the use of shaft-transmitted power, even if it is steam-driven from power developed on the premises.

CONCRETE is coming into use in mining on the European continent, mostly in the form of slag cement in shaft linings. The cost is about \$1.75 per cubic yard. The slag cement is made up of 75% granulated slag and 25% slaked lime.

THE insulating qualities of mica, used so extensively in electrical instruments, are materially affected by contact with oil. A sheet of mica spread over a thin layer of oil loses nearly one-half its normal resistance to the passage of an electric current.

WHILE a water right cannot be patented as such, a placer claim can be taken up covering the site, and this patented. That title will not preserve the water right, but will protect the site from forcible invasion while the water right is actually used.

THE largest ore crusher known to "Concentrates" is at the Bewabik iron mine, in the Mesabi range, Minnesota. Its capacity is 500 tons per hour. It weighs eighty tons, and stands 20 feet high to the top of the hopper. A 150 H. P. engine drives it.

IN a comparison between milling costs of ores in different mines the nature of the ore is the controlling element. This must be taken into account or the comparison has no instruction value. Very slight differences in nature make wide differences in costs.

FOR a turbine water wheel the forebay leading to the flume should be constructed sufficiently wide and deep to allow the water to pass to the wheel at a velocity not exceeding one and one-half feet a second. And there should be no abrupt turn to break the water into eddies.

THE nominal steam power of a boiler is ordinarily considered as 34.5 pounds of water evaporated from 212° per H. P., and under average circumstances this requires about 10 square feet of heating surface. This last depends largely on the character and cost of the fuel employed.

THE new process of making cement, the invention of Thomas Edison, is expected with a plant of 1500 barrels capacity daily to result in a cost of 80 cents a barrel, and 45 cents a barrel when a daily production of 4500 barrels is made. Also a further reduction of cost to 28 cents a

barrel is anticipated when manufacturing 10,000 barrels daily. The present selling price in large quantities at Eastern works is from \$1.15 to \$1.30 a barrel.

THE United States Geologic Survey has an exploring party in northern Alaska headed by W. C. Mendenhall, geologist, and D. L. Reaburn, topographer. They will explore northward from the Koyukuk river to Kotzebue sound. It is a country that is practically unknown.

THE occurrence of explosive gas in metalliferous mines is very rare, but there are instances, on record at Penzance, Cornwall, where in tin and lead mines the rock, when freshly cut, gave off volumes of gas. It has also been noted in opening up old levels that have long lain under water.

THE United States branch mint at San Francisco has just completed the largest single year's coinage of any mint in the world. The output for the year ending June 30, 1901, is \$80,211,426, of which \$74,482,500 is gold. The highest previous coinage of any mint was the 1881 coinage of the Philadelphia mint, \$76,000,000.

THE market for chrome iron ore has not increased very largely during the last few years. Its use in steel making, a certain proportion hardening and toughening the steel and making it especially desirable for special uses. It is also used in the preparation of pigments and chemicals. There is no market for the ore on the Pacific coast.

THE lowering in the rate of interest earning on capital accepted has been the controlling factor in many improvements in efficiency of engines and machinery. This reduction has made possible large capital investment for relatively small savings of waste. The interest and maintenance charges on this investment are less than the money saving of the waste.

THE British Government is considering a proposition to supply a large manufacturing area with fuel gas manufactured from coal by the cheap Mond process, at the rate of 4 cents per 1000 feet. It is estimated that the coal saving effected by the change will be four tons out of five. That is, one ton of coal made into gas, will do the work of five tons of coal as now used.

THE discovery of mineral on land that is patented does not require location. A vein apexing in patented land, unless it is a lode mine patent, gives no extralateral rights to the owners. It is impossible that there should be any extralateral rights, as there is no law under which they can be initiated. Location as a lode mining claim is an essential condition precedent to extralateral rights.

ANY of the location lines of a lode claim may, if established openly and peaceably, be laid within, upon or across the surface of patented lode mining claims for the purpose of embracing and including the discovery vein and all other veins apexing within the free and unappropriated ground within such location lines, and the ground itself as well, and of defining and securing extralateral underground rights upon all such veins.

THE new Arizona mining law requires in that Territory that locators of mining claims shall put up seven monuments, three at each end of the claim and one at the discovery shaft. The claim can be recorded as soon as located, but the location work can be performed at any time during ninety days after the location is made. The law goes into effect September 1st, 1901. The fee for recording claims, and affidavit of location work, is one dollar.

THE Supreme Court of Texas has decided that minerals found on school lands that the State has sold belong to the purchasers. The decision is of particular importance since the discovery of petroleum, and also calls attention to the different status of Texas school lands from those of other States. The latter all acquired their school lands by grant from the United States, but Texas has the original title to all her lands, and the decision of her own Supreme Court is final.

THE export of lumber from Alaska is not permitted by law. In manufactured form, as boxes or furniture, it can be exported. There are no surveys on which title to timber lands can be obtained. At the present time the Government charges 10 cents a thousand feet stampage, which is paid by the sawmill. All of southeastern Alaska is heavily timbered. Very large trees are not uncommon. The varieties include yellow and red cedar, spruce and fir. There is no pine.

TESTS have been made at the Puget Sound Naval Station, Bremerton, Wash., of woods for naval use. The samples were pieces 3 feet long and 4 inches square. In the three transverse tests Puget sound fir broke at 9060 pounds strain, 8310 pounds strain and 9040 pounds strain. Texas yellow pine broke at 10,660 pounds, 8310 pounds and 7640 pounds strain, respectively. In tensile tests on a spindle 1 inch in diameter the fir tests were 19,200 pounds, 18,200 pounds and 17,000 pounds strain before the fiber pulled out. The best sample of Texas yellow pine only stood 11,000 pounds strain before giving way.

IT is sometimes the case that gas engines have air inlets too small and compression spaces too large for satisfactory work in a rarefied atmosphere. When a gas engine is intended for high altitudes it should have a larger air inlet and a smaller compression space than when the same engine is to work at sea level. For altitudes of more than 5000 feet the engine should have a plate attached either to the piston or to the cylinder

head, in order to reduce the compression space. Gasoline at high altitudes evaporates at a much lower temperature than at the sea level, and it is well, therefore, to use the heavier grades at high altitudes.

WHEN rating mineral as manganese ores or as maniferous iron ores, the distinction generally accepted is made on a content of 44% manganese, i. e., ores which when dried at 212° contain 44% or more of manganese being classed as manganese ores, and those carrying smaller percentages rated as maniferous iron ores unless they have less than 3% of iron. Treasury decision 4114 orders that ore to be classed as manganese ore must contain 50% or over of manganese and not over 10% of iron; but treasury decision 16,550 allows certain ore containing less than 50% of manganese to be classed as manganese ore when the iron contained was less than 3%.

PURE feed water has an injurious effect on boiler plates. The return water from the condensers is pure water, that is, distilled water. If some kind of chemical is not introduced into the boiler with this kind of feed water, in order to neutralize this effect, it will surely pit and corrode the plates, especially in the vicinity of the mud drum. Zinc is often used in boilers and hot water tanks to prevent the corrosive action of the water on the metal of which the boiler is composed. The action is electro-chemical. Some of the water is decomposed and the hydrogen goes to the iron shell, reducing any rust that may be formed and depositing the iron on the shell. The oxygen goes to the zinc, forming zinc oxide and gradually wasting the zinc away. A boiler should be kept clean of soot. The acids in it have a more injurious effect than scale on the metal, and the presence of soot means waste of fuel.

FLOURING of quicksilver is not precisely the same thing as "sickening" of quicksilver in amalgamation. Under agitation, and particularly under agitation with solid substances, mercury breaks up into minute globules, and this is aimed at in feeding quick to a battery in order to thoroughly distribute it among the ore. Each particle is surrounded by a film of air or water, as the case may be, which, broken, the metal globules readily run together again if there is no contamination and if the particles are not so fine that the effect of gravity is destroyed and they float off. But if contamination takes place and a foul coating of grease or some of the talcose soapy earths so often present in ore gets on the particles the mercury is then in the condition termed "sickened" and it will not amalgamate the metal in the ore. Mere flouring of the quicksilver is, however, not in itself necessarily deleterious.

THE base of all clays is kaolin, which consists of alumina, silica and water combined, chemically. It is a decomposition product of some of the feldspars in granitic rocks. It can be recognized by its soapy feel and its earthy odor when breathed on. Heated, it gives off water, and heated before the blowpipe with nitrate of cobalt it turns blue. This kaolin mixed with different foreign minerals is known as fire clay, brick clay, potters' clay or by the names of minor subdivisions of these. Free silica is a very common constituent; so also are ferric oxide, magnesia and organic matters. Other minerals such as quartz, feldspar, mica, limonite and magnetite are impurities, which in large quantities impair the quality for many manufacturing uses. As a rule, the highly plastic clays are not highly refractory. Flint fire clay, which is one of the most refractory clays, is almost devoid of plasticity.

THE alternator of ten years ago, with its high-speed armature, with a surface winding held in place by band wires, is hardly recognizable as belonging to the same class of apparatus as the modern engine-type alternator. Belt and pulley have been discarded and the engine supplies the shaft and bearings. In many large machines the revolving armature has given place to a revolving field, which is constructed to have mechanical safety comparable with that of a flywheel, and, indeed, to perform the mechanical functions of a flywheel, thereby placing the flywheel precisely where it is required, without the strains which would otherwise come upon an intervening shaft. The stationary armature winding is laid in grooves or slots; it is not the hand winding of '91, but a succession of coils wound to exact dimensions on a lathe and insulated before being put in place, or else a succession of straight bars which can be shoved endwise into partially closed slots and joined at the ends by connectors of copper strap.

IN buying a boiler, it is necessary to note height of shell above the grates and the inclination of the grates, if they are to be inclined. The level of the boiler-room floor is usually fixed by apparatus other than the boilers and its relation to the floors of other departments. It is usually more convenient to make changes in the boiler fronts and setting than in the floor levels. When the grates are to be inclined at any angle corresponding to not more than 3 inches in the length of the grates, no such changes will be necessary; for a greater inclination the height of the grates at the front, measured from the level of the boiler-room floor, should be reduced. When the grates are to be level, or when inclined at an angle corresponding to 3 inches in their length, the height from the floor level to the front end of the grates should be from 26 to 28 inches. When the rear end of the grates are depressed a distance equal to one-fourth the length, the height of the front end above the floor level would not exceed 26 inches, and with a ratio of 1 to 3, would not exceed 24 inches.

The Seven Devils, Idaho.

STAFF CORRESPONDENCE.

That mountainous group of peaks and spurs in the northern portion of Washington county and the southern part of Idaho county is known as the Seven Devils. They trend from the northwest to the southeast, their crests being about 8 miles east of the Snake river. The main peaks reach an altitude of 8000 feet, the bed of the Snake river at that point being 1800 feet. It is asserted by some that the Seven Devils properly form the southwestern terminus of the Buffalo Hump, Sawtooth and Florence ranges of the Salmon river section. On the northeast side of the Devils range is Black lake and the headwaters of Rapid creek, which flows northeastward into the Little Salmon. In the same locality are the headwaters of Deep, Granite, Indian and Bear creeks, all flowing westward into the Snake. The most important of these are Deep creek and Indian creek, about 7 miles apart in their middle course, and between which is a secondary spur called White Monument mountain that embraces the copper belt which is the basis of present operations that pertain to copper mining. This copper zone, traceable from Indian creek to Deep creek, having a strike from southeast to northwest, is along the contact between diorite and porphyry. The contact material forms dikes of lime in places. The ore is carried in a gangue composed of iron garnet, silicates of alumina, iron and lime and specular iron. A considerable area of this belt is heavily timbered and the outcroppings are not readily discovered, but in the opinion of some there are two parallel contacts at the surface which may come together at greater depth. From the west contact westward toward the Snake river is a porphyry formation; from the east contact toward the Little Salmon is a diorite and granite. Along both contacts and between them are lenses of limestone. The ores comprise the blue and green copper carbonates, bornites and chalcocite. There is not much chalcopyrite at present developed depths.

The ore shoots, which trend usually in the same general direction, are considerably broken up, irregular and frequently cut off by horses of lime or diorite. The generally accepted theory is that these shoots of ore at greater depth may become more regular and concentrated and the ores more of a chalcopyrite. The point of initial discovery was on the old Peacock claim, at the northern end of the belt, facing Deep creek, and almost in sight of Snake river canyon. This location was made over twenty years ago. Present work shows a face of ore in an open cut and some similar ore is disclosed by a shaft and tunnel. South of this several hundred feet is the South Peacock, having a shaft to considerable depth which shows ledge matter, but small values. Following southward on the same general zone there are contiguous holdings for 7 miles to the bed of Indian creek.

The Boston & Seven Devils Copper Co. own the Decorah, Arkansas and Helena groups, on the slope facing Indian creek, and the White Monument near the summit; the same company has a bond and lease on the Old Peacock, South Peacock, Copper Key and others toward the north end of the belt. There is a good surface showing of copper on all these and on the Helena there are several hundred feet of work consisting of drifts in ore on three different tunnel levels. The result here is a considerable tonnage of high-grade ore ready for shipment. This company, besides working a force of men on the Decorah and Helena, on the south end, and a similar force on the Peacock group, are doing some important work with the diamond drill at both ends of the line, with the idea of making determinations as to future work on a larger scale.

The Blue Jacket group, which joins the Helena on the northwest, comprises four claims which are held under bond and lease by the Blue Jacket Con. Copper Co., of which F. J. French is manager. On this property a main tunnel goes in 900 feet, giving a depth on the vein of 350 feet. A shaft which is being sunk to intersect the tunnel is to be sunk 320 feet below the tunnel level. Shipments amounting to fifty carloads of ore were made from this property in 1900, which is said to have averaged 40% copper and brought \$25,000. The ore shipped was mainly bornite and came from above the 60-foot level. Other shipments of 150 tons were made which ran 27% copper. These ores, especially the bornites, carry about eight ounces silver and \$15 gold to the ton. The Blue Jacket is to be provided with new boilers, hoisting engines and pumps. It is also announced that a small matte smelting plant will be erected this season.

Northwest of the Blue Jacket, extending to the saddle between the Indian and Deep creeks, is the Lockwood and Sampson groups, containing good surface showings of copper, but which are not being vigorously developed. This group is important, however, as such development as it has shows a continuity of the ore belt through the mountain from one slope to the other. This belongs to A. M. Gray, who was the original locator of the Blue Jacket. E. D. Ford and T. G. Jones have located groups of claims

in the locality of the Decorah; and A. M. Tousley has for years held a group between the Peacock and Lockwood near the summit, and the small amount of development on the latter discloses the same character of copper ores as are described above. F. Alers and associates have located a group of eight claims 6 miles northwesterly from the Old Peacock, called the Red Ledge group. This is in the same general course taken by the main belt and has good surface indications of bornite ore. On the eastern slope of White Monument spur are similar copper disclosures

river, 10 miles west of Cuprum. It is operating with a small force. The Iron Dike mine is also a copper property on the Oregon side, near Ballard's Landing, but which is not operating at present.

Kleinschmidt Bros. of Helena, Montana, own the controlling interest in the Peacock, Blue Jacket and others, and have spent considerable money in the district on roads and other development. Their interest in the Blue Jacket is bonded to the Blue Jacket Con. Copper Co. of New York, and the latter are working a force of forty to fifty men. Their interest in the Peacock and other claims is bonded to the Boston & Seven Devils Copper Co., who work a force of forty or fifty men in developing, building and prospecting with a diamond drill.

Lewis A. Hall, president of the Export Lumber Co., of New York, is at the head of three companies which are interested in the Seven Devils—the Boston & Seven Devils Copper Co., the Pacific & Idaho Northern R. R. Co. and a reduction company that is erecting a matte smelter near Weiser. The P. & I. N. railway is operating from Weiser, Idaho, to Council, a distance of 60 miles up the river. The Weiser valley is well settled by ranchmen. The plans are to extend this road northward to the valuable timber belts of Payette lakes and the Little Salmon river. A portion of this extension will doubtless be made this year. The more important extension to be made this season, however, is the branch line from Council, up Hornet creek, via Bear, to some point on Indian creek, so as to furnish ore transportation for the mines of the copper belt.

The machinery and equipment for the smelter near Weiser have been ordered and work on the foundation is in progress. Peter H. Scott, the well-known millwright, is at Weiser to superintend the smelter construction. The plant will have a capacity of 100 tons per day, the equipment to be furnished by the Colorado Iron Works.

The Heath district, 18 miles west of Cambridge, in the river range, is characterized by a porphyritic quartz ledge, carrying copper and iron pyrites and carbonates. The ledge passes through a granite formation, with a lime capping. The Heath

Mining Co., of Philadelphia, have here a group of eight claims and a millsite. The property is being developed under the direction of E. P. Hall of Weiser, with R. S. Wolston in charge of the work.

Landore, Idaho, June 12.

WASCOTT.



Moon Lake; Thunder Mountain, Idaho.—(See Front Page).

near Camp creek, which is a small tributary of Indian creek.

There are four townsites located in the district, three on Indian creek and one near the summit at the Peacock. The first of those recently established was Cuprum, at a point on Indian creek 10 miles east of Ballard's Landing on the Snake. Five miles above Cuprum, on the same creek, is Decorah, which is about a mile from the Blue Jacket and Helena mines. A mile and a half up Indian creek from Decorah is Landore, the newest of the four and the mine headquarters of the Boston & Seven Devils Copper Co., of which W. B. Hancock is manager. Helena is 6 miles northwest from Landore, at the northern end of the ore zone, so far as explored, and is at an altitude of nearly 7000 feet. A postoffice has been established at Helena many years and it was the initial trading point of the Seven Devils. At a high point near Helena is obtained an inspiring view of Snake river canyon, the waters of the Snake appearing nearly 5000 feet below this point of view. Looking westward to the Oregon side and you get an excellent view of the snow-clad Eagle range, in the southwestern portion of which are the Cornucopia mines. The great lava plateau and the Imnaha valley of Oregon also spread out before you. There is a plentiful supply of timber in this section—along Indian creek and Bear creek it is quite heavy, consisting of yellow pine, red fir, tamarack and a great deal of white fir. Wagon roads have been built up Indian creek from Ballard's Landing to Cuprum, Decorah and Landore; also from these points via the Blue Jacket to Helena, via the Lockwood, Tousley's and the Peacock. A road or trail also runs from Helena down Deep creek to the Snake river. The points on Indian creek are reached by a stage road from Council, on the Weiser river, up Hornet creek, via Bear creek, the distance from Council to Landore or Cuprum being 40 miles. A road also extends from the Indian creek roads to Black Lake, where Ford Bros. are developing a gold property, on the east side of the Devils range, and on which they are erecting a small stamp mill. The same parties are developing a gold quartz property in Placer basin, which is about 6 miles southeast of Landore.

The River Queen is a copper mine near the Snake

Genesis of Ore Deposits.

PART I.

Written for the MINING AND SCIENTIFIC PRESS by
MAIT W. ALDERSON.

All mineral deposits were formed by streams, flowing on the surface of the earth at the time the deposits were made.

The minerals were in solution and by crystallization and precipitation formed deposits of quartz, etc., on the beds of the streams.

The size of a vein and its ore bodies is governed by the size of the stream that made the vein.

Unlike placer deposits, where the best values are on bedrock, the richest ore will be found on what was the top or hanging wall side of the stream.

The best ore will be found where the stream flowed quietly. Rich ore was not formed where the current was rapid, and, if found, will carry with it proof of its having been broken from the main body and transported to its present lodging place.

In the early history of the world the surface of the earth was not so irregular as it is to-day. Nevertheless, as the surface cooled there were flowing streams. Those streams formed deposits of gold, silver, copper, lead, etc., with their usual accompaniments. The first deposits were sulphide in character. Where these deposits were at such places in the stream bed as to be continually under water they continued to remain pyritic. Where, however, the vein matter was alternately beneath the stream and exposed to the air, the ores became oxidized.

The original surface of the earth was granite and, as a natural consequence, the first veins were formed in this rock. Vein-forming streams, having their sources in the granite ridges, can be traced to where they have, in reaching lower levels, flowed over gneiss, quartzite, slate and limestone, so the same

vein may be found in what are usually classed as different geological ages and periods.

Some veins were formed before the elevation of the present mountain ranges, and in some instances the mineral-bearing streams continued to flow after the mountains were partially elevated. In some important mineral-bearing sections, where the precious metal deposits are found in veins in the foothills, the pay shoots will be observed to take a general direction corresponding to the course of the range itself, and there will be parallel veins. The nearest range will often be perpendicular, another at an angle less steep, and oftentimes a vein—the last deposit—practically blanket in character. Following the first disturbance of the earth's surface—metamorphic or otherwise—the country between the elevations was leveled down, the lower places being filled with the detritus of places above. In time the streams formed new beds and new deposits of ore were made thereon. In some sections a number of local disturbances occurred and a number of veins are accordingly found at different angles.

In the process of cooling the exterior crust of the earth was crumpled by lateral pressure, some portions of the surface being elevated and other portions being depressed. In other instances the crust of the earth was disturbed by volcanic action. The position in which a mineral-bearing vein is found is dependent upon the manner in which a certain section of the surface has been elevated. The elevation of a given section might have been produced in such a way as to tilt the ore deposit to the side or set it on end. As a matter of fact, however, the ore deposits set on end are the exceptions; most of them will be found on their sides.

The discoveries leading to the conclusions above outlined form a theory the beauty of which lies in its practicability—its usefulness in every day work in the mines. One has a theory of vein formation on which he can depend, which fits his mine and which does not constantly require some new theory to explain slight changes in a vein or the formation in which it is found. "One truth always harmonizes with every other truth," and, unlike the theory of metasomatic action, the shearage zone theory or the fissure vein theory, this theory explains the most peculiar and complex situations. One familiar with it soon learns to depend upon it and to gain confidence in his ability to go from one shoot of pay ore in his mine to another of like character.

There is a theory to the effect that base ores are found below water level and oxidized ores above, which has been so long accepted as true that no one, apparently, thinks of questioning it. It seems almost sacrilege to break an idol which has been revered for ages, but the writer cannot recall a single mine that that theory will fit. If he calls another's attention to the fact that it does not apply to some particular mine or place, he is met with the remark, "It is the exception that proves the rule." Now, I submit that a rule that is proven by its exceptions is better honored in the breach. In such a case it would seem to be the part of wisdom to formulate a rule based on the exceptions. There is no difficulty in finding pyritic ore in Montana from the surface downwards, above water, and oxidized ore below water. In the Minah mine, at Wickes, Mont., are two shoots of ore, one of which was pyritic from the start, the other oxidized. Each has retained its character, the shoots running side by side to the lowest workings of the mine. In the Sunrise mine, Granite county, Mont., the pyritic ore occupies a higher level than the oxidized ore that has been mined. In the Bunker Hill mine, in the same county, no pyritic ore has been found in the lower levels and no oxidized ore in the higher levels. But the reverse is true, the oxidized ore being found below and the pyritic ore above; and the ore in this mine is in the exact position it was when originally deposited. In the Howard mine, Lewis and Clarke county, pyritic ore has been reached several times, but oxidized ore was invariably found again in the same shoot on sinking to lower levels. There is, practically, no oxidized ore above water level in Nova Scotia, while in Cornwall, England, vast regions of "weathered" copper ore are found "far below the level of the neighboring sea." Thus at Dolcoath "some of the earthy-brown ore was found as far down as the 197-fathom level." The fact of the matter is that there has been no change of consequence in any ore body since it was originally formed. To oxidize ore beneath the surface by the percolation of fluid carrying oxygen is an impossibility, and that is something that nature never attempts. In the first place, the ore is impermeable to the fluid, and in the second place a sufficient quantity of oxygen to bring about the reaction cannot be brought into contact with the particles which it is sought to affect. Let us take pieces of pyritic ore from mines in Nova Scotia and from some I might name in Montana, and expose them to the action of water and air. There will be very slight changes on the surfaces in the course of years. Now, let us take other pieces of the same kind of ore from the same mines and crush them and expose the crushings to the action of air and water. We need not stir them. We may leave them in a pile. In a few years they will be almost perfectly oxidized. They will form a matte of brown, oxidized ore, such as is found in the zone of oxidized ore in the mine from which the ore was taken. Let us run assays on

the freshly made concentrates and those which have been exposed to the air for a year or two. The first will require twenty grains of potassium nitrate to oxidize the sulphurets so a lead button of proper size may be obtained, and the latter five grains or less. The writer's observations have led him to the conclusion that pyritic ore is found in such portions of the bed on which they were originally deposited as were continually under water; the oxidized ore on those portions where at intervals, before the crystallized sulphurets formed into a solid mass, the surface of the ore body was exposed to the oxidizing action of the air.

It stands a man in hand to be cautious about criticizing theories that have been handed down through the centuries, but after having attempted to apply them in a practical way, only to meet with failure, what is he to do? It seems to me that the wise man will stop and investigate and see if the theory is not at fault. The writer is not alone in having abandoned the idea of veins having been formed in fissures. Our present knowledge of terrestrial physics precludes the idea that a vein could form in a fissure in the earth's surface. A crevice in the earth would have to remain open to an uncertain depth for an indefinite length of time in order that the quartz containing the precious metals might be deposited in such a crevice from solutions containing them. This could not be done for several reasons: 1. The natural contraction of the earth's surface would close the crevice. 2. If it were possible to keep the crevice open, it would be filled with debris from the surface of the earth long before it could be filled with quartz. 3. Before the water containing the quartz and gold in solution could flow upwards—as is oftentimes conceived—through the crevice, it would have to fall downwards through some corresponding crevice at a great altitude, because water will not flow uphill without being confined and forced, whether that force be hydrostatic or thermal. 4. It is not among the possibilities of nature to form a crevice in the earth with walls such as are found on the sides of so-called fissure veins. One wall will be almost invariably smooth and regular and the other irregular. Not only is it impossible to split a rock to produce such a result, but it is impossible to fracture any massive rock so the sides of the pieces will be smooth. As well might one attempt to split a candle with the expectation of the sides of the sections being as smooth as many a wall in a mine. 5. It is not possible to make the clay gouge hang to the side walls of a fissure vein while we remove the quartz. How, then, could it be made to stay there while the quartz was being formed?

Apparently unanswerable criticisms may be made against nearly all the theories thus far advanced to account for the origin of ore bodies. Kemp, in his "Ore Deposits," after considering the methods of filling of mineral veins, says—page 40: "The discussion is practically limited to lateral secretion and ascension by infiltration." The theory of "derivation of the contents of a vein from the wall rock" is utterly untenable. Take veins in gneiss, for instance. The wall rocks will be found to be practically impermeable to any solution, and, generally speaking, the ore itself cannot be successfully leached until it has been very finely crushed. Is it reasonable to suppose that waters would course through solid rock when they could find easier channels by following the stratification? Kemp, himself, says of the theory of ascension by infiltration—page 41: "This theory is of necessity largely speculative, because the materials for its verification are beyond actual investigation." Can the everyday working miner derive advantage from a theory in which the educated man who advances it is compelled to express lack of confidence?

With the knowledge that all veins were formed from substances in water flowing on the surface of the earth, or in ponds and lakes, at the time the deposits were made, and every vein carries positive proof of this, the queries naturally arise: From what source did these veins receive the minerals? How did they get into the streams and thence to the larger bodies of water? From our knowledge of the constituents of the earth, we know that vein matter is but an aggregation of what may be found in small quantities elsewhere. Thus gold, the most precious of the vein materials, is almost universally distributed, being found in infinitesimal quantities in the water of the ocean and the rocks and sands of almost every portion of the globe. It has been supposed that a part of the silica which makes up so much of the total of some veins was obtained by the solution of that substance from granite, but Le Conte tells us—"Elements of Geology," page 7: "Quartz is unchangeable and insoluble in atmospheric water." And, so far as we know, Nature has no solvent in her laboratory for gold once in the solid form. So it is impossible that the gold or quartz in quartz veins was obtained by the leaching of vast quantities of granite or other rock containing large quantities of silica and very small amounts of gold. We must look elsewhere for the source of supply.

Various attempts have been made to prove that the contents of veins came from the bowels of the earth. Many authorities consider that in some way or other volcanic action has had much to do with the formation of veins, even in the face of the fact that the different kinds of lava are the most barren of the

precious metals of any of the rocks. In reality, there is no reason to expect values in any molten rock, for what is such rock but the slag of Nature's operations in melting? Any of the precious metals, if present before the melting, would either be sublimated or left in the bottom of the furnace. Our knowledge of metallurgy tells us that the heat generated in volcanoes would volatilize most metals. Possibly there would not be sufficient heat to volatilize iron, and we find, accordingly, that that is the one metal found in any quantity in lava. But sulphur and galena would volatilize quickly, and it so happens that these are most abundant in the veins known to be of earliest origin. Then, it is not hard to find beds of what seem to have been volcanic ashes in what was the bottom of the stream on which quartz was deposited, as is the case in several mines in Lewis and Clarke county and Jefferson county, Mont. If, near a smelter where sulphide ores are being treated, we place a sheet on the ground, on the side of the smelter to which the smoke curls, we will soon find it covered with little black specks, showing the burn of sulphuric acid. This is a practical demonstration of what Nature might carry out on a larger scale. We have good reason, therefore, to assume that the precious metals, the sulphur and the silicon entered the air as gases from the throats of volcanoes, where they would be changed to a fluid state, and in this condition reach the surface of the earth and the flowing streams.

Whether on further investigation this view of how the precious metals came into the solutions from which they were crystallized and precipitated to form veins of quartz be demonstrated as correct or not, there can be no question but that the veins themselves were made by flowing streams, and the practical mining man is more interested in how to read his vein and in keeping in pay ore than in any theory as to where the metals may have come from. In a future article, therefore, I shall give directions whereby one may follow his ore with certainty by following the original course of the ore-bearing solutions, pointing out, also, how one may know when he has reached the probable limit of pay ground in his mine in any given direction.

(TO BE CONTINUED.)

Smelting of Siliceous Lead-Copper Ores (Carbonates) at Llano, Sonora, Mexico.

Written for the MINING AND SCIENTIFIC PRESS by ARTHUR HAUMAN.

I.—Composition of ores and fluxes:

	Lead-Copper Ores.	Iron Ores.	Dolomite.	Coke (Alabama).
SiO ₂	48.0%	21.0%	6.0%	10%
FeO.....	8.8%	36.4%	3.0%	8%
				(Al ₂ O ₃ +F ₂ O ₃)
CaO.....	2.0%	12.0%	26.0%	....
MgO.....	....	1.5%	19.5%	....
Cu.....	10.0%	....	....	....
Pb.....	13.5%	5.0%	....	....
Sb.....	2.0%	....	....	....
	O,CO ₂ ,AgAu	O,CO ₂ ,AgAu	CO ₂	....

II.—Plant: Round (36" di.) water-jacket blast furnace. No. 4 Root blower.

III.—Capacity: 40 tons in 24 hours.

IV.—Bullion analysis: Cu, 55.5%; Pb, 40%; Sb, 1.8%; Au, 5.5 oz.; Ag, 78 oz.; S and Fe, traces.

V.—Slag analysis: SiO₂, 41%; FeO, 21%; CaO, 20%; MgO, 8.6%; Al₂O₃, 0.7%; PbO, 1.3%; CuO, 0.7%; total, 93.3%, being a sesquioxide of the formula, (2CaO, FeO, MgO) 3 (SiO₂), or 4RO+3SiO₂, O in bases 4; O in acid 6=1:1½.

VI.—Cost of smelting:

(a) Labor—	
3 Feeders, Mexican, 8 hrs., \$1.....	\$ 3 00
3 Asst. feeders " 8 hrs., 75c.....	2 25
3 Tappers " 8 hrs., \$1.....	3 00
6 Pot wheelers " 8 hrs., 75c.....	4 50
2 Firemen " 12 hrs., \$1.....	2 00
4 Carmen " 10 hrs., 75c.....	3 00
1 Blacksmith " 10 hrs.....	2 00
1 Night foreman " 12 hrs.....	2 50
1 Day " white 12 hrs.....	5 00
1 Assayer ".....	2 50
1 Superintendent ".....	12 00

Cost of labor 24 hrs.....\$ 41 75

(b) Coke 17% of 40 tons at \$17 per ton.... 115 60

(c) Water (hauling)..... 25 00

(d) Ore and flux to mine, break and haul at \$2..... 80 00

(e) Wood (for power)..... 3 50

Total.....\$265 85

Add 10% for unforeseen delays, etc..... 26 60

Net total.....\$292 50

Net cost to mine and smelt a ton... 7 31

Net cost to smelt a ton..... 5 31

[The U. S. money equivalent of these figures is approximately \$3.65 and \$2.65 a ton.—ED.]

As shown by analyses, the ores are oxidized, carbonates, very siliceous. The iron flux was very poor, comparatively high in SiO₂ and low in Fe. However, this being the only material on hand at the time, and as it carried enough Ag and Au to warrant its use, the best advantage had to be taken.

The dolomite on hand brought, as the slag analysis

reveals, the MgO up to 8.6%. Authorities on lead smelting decry the use of dolomite as flux, the MgO being an undesirable constituent of the slag mixture; nor do they advocate a high siliceous slag or one low in iron.

Studying the situation, and hunting in vain through "Peters" and "Hofman" to find some one in a similar "fix," it was concluded to start with a fairly basic slag and run it up to the maximum of SiO₂.

Some experiments with crucible charges were tried, although they could not duplicate the conditions in the blast furnace. After heating to a bright yellow, the crucible charges were finally poured and the slag analyzed: SiO₂, 40%; CaO, 24%; FeO, 8%; MgO, 9%. The deficiency in iron was caused by reduced iron, found at the bottom of the crucible. No concern about this latter phenomenon was felt, however, as the contents of the furnace would be frequently (every ten minutes) removed, giving very little chance to form "sows," especially with a high siliceous charge.

In comparing the crucible trials with the final slag made at the smelter, the results came as close as could be desired, except the percentage of FeO, the deficiency having been explained. The slag settled on, ran magnificently, very liquid, and was remarkably free from prills of metal, the Cu and Pb contents as low as could be expected, without use of a forehearth. The use of the latter would be out of question for a furnace below eighty tons capacity. It was found advisable to run on an 18% fuel charge, although the furnace would run on 16½% coke.

The average analysis of slag showed 41% SiO₂; there were periods when it would run up as high as 45% SiO₂. In order to tide over these danger points, the furnaces had to be kept very hot, using somewhat more fuel; a sharp lookout was kept for overfire, which would cause a chill in short order near the melting zone. No such chances can be taken with a small forty-ton furnace as with a larger one, which can be "brought around," chills in an astonishingly short time, especially if the blast is not cut down immediately and the top fire smoldered.

The bullion had a specific gravity of 6, the slag 3.2 to 3.6, insuring a good separation. According to the deduced formula, the slag contained one-fourth of the base magnesia. Although the latter is credited with forming a sticky, pasty slag, no trouble was experienced in this case. "Balling" informs us that any mixture of two or more silicates has a lower formation point than each individual single silicate; and in the case of the earths, that their bisilicates (and a mixture of two or more) are more liquid than their respective single and sesquisilicates.

Although in this case the slag was calculated for a sesquisilicate, at times there must have been a large excess of SiO₂, which was taken care of without the serious consequences of a "freeze up" by MgO and CaO to form their bisilicates.

As emphasized before, MgO amounted to one-fourth of the bases. Prof. Hofman, in a late paper, gives the benefit of his experiments with silicates. He found that if magnesia replaces one-eighth of the lime the formation temperature rises, then it falls until one-fourth has been replaced, then it rises until one-half has been replaced, etc. The behavior of the slag would bear out this statement. The writer was aware that successful slags had been made running as high as 55% in silica and low in iron. The proverbial Mansfield slags, which, like the unfortunate Table mountains of California are mentioned in every text-book, and the Deadwood slags are examples; but in either case hot blast was used or sulphide ores were treated.

In this case a highly siliceous oxidized lead-copper ore free from sulphur had to be smelted. Previous attempts to smelt it in reverberatory furnaces ended in a total failure; concentration dry or wet was out of the question.

No sulphide ores being in the neighborhood, no matte was formed and all the values Au, Ag, Cu and Pb were found in the bullion. Although running up between \$300 and \$400 a ton, the bullion is not a very desirable one, because:

1. Being high in copper (55%), it can not be refined with the customary lead bullion; the refining work has either to make an extra run or mix it with other lower grade bullion, or it has to be refined at the spot, which would not pay for lots below 100 tons.
2. It is difficult to sample; sometimes a copper dross or lead layer forms on the surface of the pigs. Bottom and top must be drilled—a painfully slow job with a hand ratchet drill. There are hardly two pigs which assay alike.
3. No siphon tap or lead well can be used; the alloy would chill the discharge pipe.
4. Great care has to be taken to tap all the metal out of the crucible and rinse the orifice with hot slag, driving home a steel bar immediately; no bar will penetrate the tough metal once chilled in the spout. The "cheap" Mexican labor could advantageously be replaced partly by skilled white labor. "Peppi" would never hurry to "tap" even if the slag threatened to depart "via tuyeres." At the feed floor, if not watched, he would ignore the scales entirely, dumping in the furnace whatever was nearest. One "experto" would load his shovel by picking up with one hand carefully one-half dozen lumps of ore; or another, never having seen a rake, would use it as a pick. The many days of the saints are scrupulously

observed with drinking, singing and dancing; and if the peddler selling the mescal (a vile brandy made of cactus) on the sly is not caught in the nick of time, the whole crew will drink and fraternize till the last "centavos" is spent, then "Peppi" will be a "bueno muchacho," till the next peddler causes another shutdown. "Manana" (to-morrow) is as often heard as the word "money" in the United States. Still the people live and are happy—true philosophers—never worrying for manana, which is not always true of the man in charge of a plant, who has to play at times tapper, feeder or foreman till "Peppi sables." He will, perhaps, manana!

The Formation of Bonanzas in the Upper Portions of Gold Veins.*

BY T. A. RICKARD, DENVER, COLO.

INTRODUCTORY.—The presentation to the Institute eight years ago of the paper of Posepny on "The Genesis of Ore Deposits," has borne fruit in much fresh investigation, as is evidenced, for example, by the group of very valuable papers, by distinguished members of the United States Geological Survey, read at the Washinton meeting—discussions of general principles particularly suggestive to those who are engaged in mining.

Posepny, in the discussion of his famous treatise, said that the present writer seemed to look at every new conception in the ore deposition "from the sole standpoint of its immediate usefulness in mining." Protesting mildly against "sole" and "immediate," I accept the impeachment. It calls for no defense.

THE DEVELOPMENT OF RECENT THEORIES.—Given the idea of an underground water circulation as the chief factor in the deposition of ore, the next step in the inquiry as to the genesis of such deposits is the endeavor to determine which particular part of the general water circulation is responsible for the results. Around this question have centered the controversies of a generation, and to these controversies we owe the gradual clarification of our ideas upon the process of ore formation. It is unnecessary to sketch here their progress from Werner to Le Conte, who combatted in 1883 the extreme views of the lateral secretionists, and in 1893 opposed the narrow interpretation of the ascensionist theory. The generally accepted opinions of to-day are a well deserved tribute to his philosophic discrimination.

Thanks to Prof. Van Hise and Mr. Slichter, whose work he utilizes, we have now arrived at a comprehensive conception of the underground circulation, which emphasizes the conclusion that sulphide ores are generally deposited by ascending waters. In estimating the importance of this conclusion, it is to be remembered that, apart from placers and iron mines, the largest portion, by far, of the ores exploited by the miner are sulphides. Moreover, it has been shown that the other, equally essential, parts of the circulation, namely, its lateral and descending portions, particularly the latter, also play their part, to which many "secondary enrichments" are due.

This approach toward an understanding of the processes of secondary enrichment in ore deposits is an extremely important advance in the application of geology to the exploitation of mines. For such enrichments pre-eminently constitute the ore masses valuable to man. Chemistry and physics may unite in determining the conditions favorable to the precipitation of gold; geology may unravel the intricacies of rock structure, but it does not come within the province of these sciences to decide whether a gold vein will prove rich enough for profitable mining. Nature knows no ratio of sixteen to one, or any other standard of monetary value. Therefore, the determination of the particular conditions favorable to the mere occurrence of gold ores remains but a barren discovery until it includes some suggestion as to the search for the richest portions. To the geologist, material carrying 2 dwts. of gold per ton is as truly an auriferous deposit as if it contained 12 dwts. per ton; but, under existing economic conditions, the miner may regard the former as only fit for macadam, and the latter as potential of fortune.

When the science of ore deposits, therefore, has predicted with certainty the places where gold can be found, it has fulfilled a conclusive test of a true theory. But this means to the miner no more than the restriction of his search for profitable gold deposits to those places where there is any gold at all—a restriction which, after all, amounts to little, for the progress of scientific inquiry and practical exploration has rather enlarged than diminished the field of the distribution of this metal. A greater service will be the determination of the conditions which control the formation and distribution of those particular portions of the multitudinous deposits of gold which constitute the secondary enrichments of the geologist and the bonanzas of the miner.

Such a desired consummation seems now to be nearer of attainment. The practical result of the papers of Van Hise, Emmons and Weed will be to direct attention to the one line of inquiry most useful to the miner. Unquestionably the theories of secondary enrichment have been largely suggested by the experience of the men whom the geologists have

met at the mines; and the invaluable assistance thus given to mining engineers is a pleasant outcome of such an exchange of views.

THE ENRICHMENT OF GOLD VEINS NEAR THE SURFACE.—A quartz lode carrying gold in association with pyrite is here taken as the type of deposit under discussion. In lodes of this kind it is a common experience to find bodies of rich oxidized ores extending to a variable depth from the surface. In this general phenomenon of enrichment two processes must be separately recognized, namely, relative enrichment by the deposition of additional gold through secondary reactions.

ENRICHMENT BY CONCENTRATION.—The iron sulphide accompanying the gold is removed by weathering. Weathering is a process of chemical decomposition and mechanical disintegration in which oxidation is aided by the shattering of the rock due to the alternate expansion and contraction of the water present in its pores, seams and cavities. The depth to which these effects extend will depend upon the facilities afforded for the penetration of surface waters carrying free oxygen; and it will be regulated by the local groundwater level. The results observed usually cease at the groundwater level, because at that horizon the descending surface waters become mingled with the larger body of neutralized water, and so lose their free oxygen. When, however, they can find channels permitting a relatively rapid passage, they may not become at once diffused, and may thus continue their oxidizing action even below that level. But the actual lowering of the groundwater level, by a change of surface altitude or hydrostatic conditions, affords the chief factor in enlarging the scope of such oxidizing action on the part of the surface waters. The chemistry of the process is pretty well understood, and need not be discussed here.

In the case of enrichment by concentration the evidence indicates that the leaching and removal of the pyrite has been affected without shifting the gold, which remains behind in its native state. I have specimens from Idaho and West Australia exhibiting crumbly native sulphur, within the cubic cavities vacated by the pyrite, and in those from West Australia there is also gold in fine crystals which are readily shaken loose. The removal of pyrite; the occurrence of fine particles of gold in the vacant casts produced by this removal, and the formation of a sinter honeycombed mass of iron-stained quartz are familiar aspects of the process of natural concentration.

Weathering, then, by removing the baser and more soluble constituents of the vein, decreases the weight without diminishing the volume of the ore, which thus becomes so much the richer per ton. Iron-stained gossan, rich in gold, is a familiar occurrence in mining, and the frequent development of such material has had a far reaching effect in determining the character of the industry. Apart from the richness of such oxidized ore, its metallurgical docility greatly enhances its value. In comparison with the unaltered and relatively refractory pyritic ores, the oxidized material is not only easier to crush, but also easier to treat by amalgamation, chlorination, etc. Hence the contrast which is occasionally offered between the early successes of the discoverers of a gold vein and the subsequent troubles of the mining company which buys their property. The gossan of the gold vein has been the source of a large part of the world's store of the precious metal; and to it we owe the successful beginnings of many districts, which, if they had been compelled to commence operations upon refractory pyritic ore, would have waited long for their active development.

SECONDARY ENRICHMENTS DUE TO DESCENDING SURFACE WATERS.—The diagnosis of the general process by which these are formed by descending waters has been stated in clear terms in the contributions of Van Hise, Emmons and Weed.

The occurrence of restricted bodies of extraordinarily rich gold-bearing quartz has been a startling feature of gold mining in all countries. From them fortunes have been made with picturesque suddenness; and by means of them the inexperienced have been led into sanguine expectations, the failure of which has brought disasters not less romantic, though much less welcome to their victims. Such instances have furnished matter for proverbs concerning the uncertainty of mining; but they are soon forgotten. Nevertheless, the uncertain occurrences of rich ore on which they are based present an important feature of the ore deposits in all gold mining districts, though they are more particularly characteristic of desert regions, such as the area of the Great Basin, stretching between the Rocky mountains and the Sierra Nevada, and also those arid parts of Australia and West Australia which have yielded so much of the wealth of the colonies.

The outcrop of a gold vein is not always the richest portion. The sinter gossan formed at the immediate surface may be poor in gold, and yet may be succeeded near, or even below, the water level, by extremely rich masses of half-decomposed pyritic ore. In such cases it would appear that the gold had been leached out of the oxidized portion of the lode, and had migrated in the wake of the iron until precipitated, so as to form the secondary enrichment now under discussion.

In considering the formation of these bonanzas, one

* Trans. Am. Inst. M. E., Richmond meeting, February, 1901.

of the first problems presented is the question of the mode of occurrence of the gold in the pyritic quartz of the lode. The evidence as yet available indicates that the gold does not exist in chemical combination with the iron sulphide of the pyrite, but usually occurs in minute filaments or crystal aggregates distributed through the substance, and especially along the structural planes of the pyrite. In my collection I have a handful of fragments of pyrite obtained from the Orphan Boy mine in Boulder county, Colo. This mine was the beginning and end of a mining excitement which happened in the spring of 1892, in connection with a locality named Copper Rock. Under a magnifying glass the specimens exhibit little crystals of gold, which, by the rounding of their edges, appear in places as globules distributed over the facets and in the crevices of the pyrite.

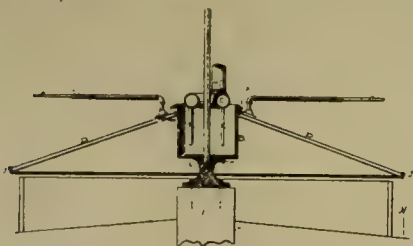
(TO BE CONTINUED.)

Mining and Metallurgical Patents.

Patents Issued June 25, 1901.

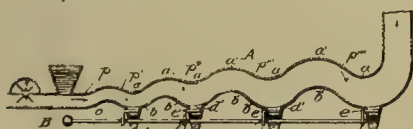
Specially Prepared for the MINING AND SCIENTIFIC PRESS

ORE WASHING MACHINE.—No. 676,905; W. O. Miller, Galena, Kans.



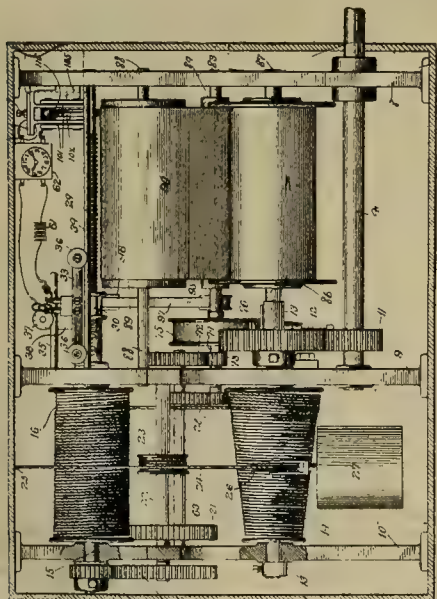
The combination of a separating surface, a rotating distributing cone above surface, provided at apex with a cup which generally lies below surface of cone, and is provided with flanges overhanging cone, and delivery device comprising a closed hollow ring, and spray tubes depending from ring nearly to bottom of cup.

ORE CONCENTRATOR.—No. 676,969; A. H. Stebbins, Little Rock, Ark.



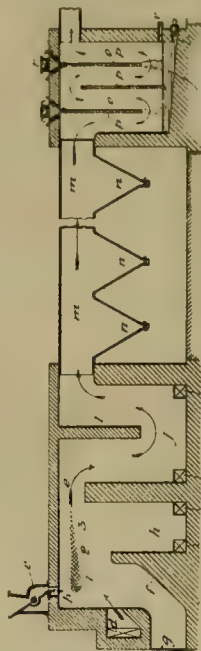
An undulating casing provided with an inlet and an outlet and having a gradually increasing cross sectional area from inlet to outlet, upper and lower walls of undulating casing being correspondingly curved to form oppositely curved elevations and depressions, in latter of which, formed in lower wall, concentrates may settle, so that a blast of air striking down bend or curve in upper wall of casing blast will be deflected to strike concentrates in lower part of curve in lower wall of casing to effectually clean concentrates collected and to separate lighter from heavier concentrates.

RECORDING DEVICE FOR HOISTS.—No. 677,286; F. M. Stanton, Houghton, Mich.



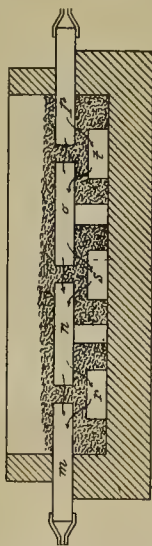
A recording web, means for moving same at a predetermined speed, a stylus, means for moving it across web at a speed proportioned to that of moving element to be timed, means for causing stylus to be brought into contact with web, and means for periodically deflecting stylus from normal or main path of movement.

PROCESS OF ROASTING MIXED SULPHIDE ORES.—No. 677,263; E. C. H. Pape and C. A. L. W. Witter, Hamburg, Germany.



Process of treating sulphide ores containing metals which are volatile at a temperature at which they cannot combine with oxygen, which consists in heating a combustion chamber to temperature necessary to ignite sulphides in ore, introducing a heated current of air in chamber, then feeding finely divided ore into chamber so that it passes through current of heated air, maintaining temperature above that at which a part of metals can combine with oxygen, allowing metallic vapors carried forward to combine with oxygen, and then collecting the matters so carried forward.

ELECTRIC SMELTING FURNACE.—No. 676,985; H. Koller, Nuremberg, Germany.

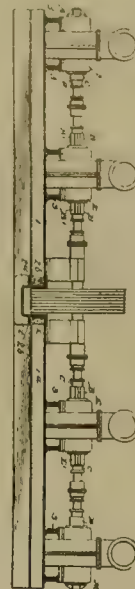


The combination of two end electrodes, and means for supporting them above bottom of furnace, and a disconnected intermediate electrode, having means for supporting same intermediate of and approximately in same level as end electrodes, and a series of disconnected electrodes on bottom of furnace intermediate of ends of raised electrodes.

PROCESS OF EXTRACTING METALLIC OR NATIVE COPPER FROM ORES OR TAILINGS.—No. 677,089; J. C. Kessler, Milwaukee, Wis.

The process for extracting metallic or native copper from ores or tailings, consisting—first, placing such ores or tailings in an uncovered water-tight receptacle; second, in application thereto, for a suitable period of time, of a solution of any cupric compound in ammonia; third, in forming a liquid seal upon surface of solution; fourth, in drawing off and separating concentrated copper solution from remaining tailings; fifth, in precipitating, by electrolysis, about one-half of copper contained in concentrated copper solution; sixth, in returning solution back to tank for repeated use upon other untreated ores or tailings; seventh, in precipitating by electrolysis all copper contained in so-called weak solution; and eighth, in the application of weak ammonia solution remaining, after the copper has been thus precipitated (instead of fresh water as in the first instance), to tailings or ores subsequently treated in leaching tank.

PUMP BATTERY SYSTEM.—No. 677,217; E. M. Ivens, New Orleans, La.



The combination with channel bars 1 1' and transverse bars 3; of cast pit 2, having closed sides, bottoms and ends, and lateral seat flanges 2', at a point below its upper edge, whereby the upper ends of sides thereof form abutting portions for adjacent ends of bars 1 1', and flanges form connecting supports for channel-bar ends.

Portable Belt Conveyors.

The Robins Conveying Belt Co., of 15-21 Park Row, New York, has recently perfected and patented some new forms of portable or movable conveyors for various services, two of which are here illustrated. Fig. 1 shows a conveyor which was built for filling



FIG. 1.



FIG. 2.

stopes with rock at the mines of the Moctezuma Copper Co., Nacosari, Mexico. Fig. 2 shows a conveyor which was shipped to a foreign port for loading coal into vessels.

Portable conveyors are of especial value to contractors and miners, being useful for loading and unloading vessels and cars, for stacking coke, carrying material from excavations and for other similar purposes.

The Robins portable conveyor is claimed by its manufacturers to be in all its forms entirely self-contained. It consists of a belt conveyor mounted on a light steel frame and driven by a direct-gear engine or motor as may be desired. The truss or frame is of light but rigid construction and is built in short, separate sections which are bolted together. By leaving out or putting in one of these sections, the length of the conveyor may be varied up to 50 feet to suit the requirements. The frame is designed to protect the running parts of the conveyor against the blows and rough usage which this kind of machinery always receives, and the engine or motor is enclosed and protected from dust, as are also all the bearings in the machine.

MINING SUMMARY.

Specially compiled and reported for the
MINING AND SCIENTIFIC PRESS.

ALASKA.

KETCHIKAN.

S. I. Silverman of Spokane, Wash., says of Prince of Wales island that he has bonds on forty claims on Copper mountain, on Copper harbor, on the west coast of the island. On the eighteen claims bonded from the Alaska Copper Co. of Juneau there has been considerable work done and on one of the ledges an ore shoot 400 feet long and 20 feet wide developed that gives very high copper values. A tramway a mile long has been built to a wharf at the harbor and a sawmill and buildings constructed. The ore is malachite and chrysocolla in a quartz gangue and will go 30% in copper, besides carrying good values in gold and silver. It can be smelted at the mine to an 85% matte at a cost of not more than \$3 a ton. The general appearance of the country is like Rossland, B. C., in 1894. There is a difference in the respective ore zones though. In Rossland the ore zone was 3 miles long and 1 mile wide. Prince of Wales island is 140 miles long and 40 miles wide and it looks as if mines would be found all over it. It looks as though the rush to the island had already commenced. There are nearly 500 miners at work now. P. Clark of Spokane, Wash., is working a gold property on Twelve-Mile Arm. J. Freeburn, formerly with the War Eagle and Le Roi, at Rossland, B. C., has been examining mines on the island for the last year. S. Lichtenstadter of Salt Lake City, Utah, is working the Mount Andrew group of copper claims—a mountain of ore. H. Bratnober of the London Exploration Co. is with him.

ARIZONA.

COCHISE COUNTY.

The Lowell & Arizona C. M. & S. Co. have sold all their mines and plant at Bisbee to the Copper Queen Con. M. Co. for \$500,000 cash and the property is now operated by the buyers. The stock in the first named company is being retired and it will go out of business. Bisbee, Ariz., June 27.

CALIFORNIA.

The total yield and value of mineral substances of California, for the year 1900, are reported in the appended table by State Mineralogist Lewis E. Aubury. The figures were obtained in response to inquiries made of producers:

Antimony, 70 tons.....	\$5,700
Asbestos, 50 tons.....	1,250
Asphalt, 12,575 tons.....	253,950
Bituminous rock, 25,306 tons...	71,495
Borax—	
Refined, 1602 tons.....	165,036
Crude, 24,235 tons.....	848,215
Cement, 62,000 barrels.....	121,000
Chrome, 140 tons.....	1,400
Clay—	
Brick, 137,191 M.....	905,210
Pottery, 59,636 tons.....	60,956
Coal, 176,956 tons.....	535,531
Copper, 29,515,512 pounds.....	4,748,242
Fuller's earth, 500 tons.....	3,750
Gold.....	15,863,355
Granite, 311,803 cubic feet.....	295,772
Gypsum, 2522 tons.....	10,088
Lead, 1,040,000 pounds.....	41,600
Lime, 312,517 barrels.....	283,699
Limestone, 32,791 tons.....	31,532
Lithia mica, 440 tons.....	11,000
Macadam, 360,597 tons.....	262,570
Magnetite, 2252 tons.....	19,333
Manganese, 131 tons.....	1,310
Marble, 4103 tons.....	5,891
Mineral paint, 529 tons.....	3,993
Mineral waters, 2,456,115 gallons	268,607
Natural gas, 40,565,500 cubic feet	34,578
Paving blocks, 1192 M.....	23,775
Petroleum, 4,329,950 barrels.....	4,152,928
Pyrites, 3642 tons.....	21,133
Quartz crystals.....	18,000
Quicksilver, 26,317 flasks.....	1,182,786
Rubblie, 428,690 tons.....	299,072
Salt, 89,338 tons.....	204,754
Sand—	
Glass, 2000 tons.....	2,000
Quartz, 200 tons.....	200
Sandstone, 378,468 cubic feet...	254,140
Serpentine, 350 cubic feet.....	2,000
Silver.....	1,510,344
Soda, 1000 tons.....	50,000
Slate, 3500 squares.....	26,250
Tourmaline.....	500
Turquoise, 500 pounds.....	20,000
Total.....	\$32,622,945

In the previous year the total product was valued at \$29,313,460, so that the increase for the year is \$3,309,485. The total product of metallic substances for the year 1900 was \$23,358,730, an increase of \$2,053,707. This includes gold, silver, mineral paint, quick-

silver, antimony, copper, lead, manganese and chrome (silver is given in coining value).

The total value of non-metallic substances was \$2,177,197, a decrease of \$268,873. This includes borax, coal, mineral waters, salt, asbestos, gypsum, magnesite, pyrites, lithia mica, fuller's earth, quartz crystals, soda, tourmaline and turquoise.

The total value of hydrocarbons and gases was \$4,512,951, an increase of \$1,332,931, including asphaltum, bituminous rock, natural gas and petroleum. The total value of structural material was \$2,574,067, an increase of \$191,720. This includes brick and pottery clays, hydraulic cement, lime and limestone, macadam, rubble and concrete rock, paving blocks, marble, granite, sandstone, serpentine, slate, quartz sand and glass sand.

The relative value of the principal mineral products of the State is as follows: First, gold; second, copper; third, petroleum; fourth silver; fifth, quicksilver; sixth, borax.

There are 28,672 men employed in the industries represented in the above table.

RELATIVE RANK OF COUNTIES.

1.—Shasta.....	\$5,574,026
2.—Los Angeles.....	2,155,198
3.—San Bernardino.....	1,965,143
4.—Nevada.....	1,916,899
5.—Calaveras.....	1,905,856
6.—Kern.....	1,867,856
7.—Tuolumne.....	1,659,253
8.—Amador.....	1,479,009
9.—Placer.....	1,128,882
10.—Siskiyou.....	1,010,383
11.—Mono.....	752,121
12.—Trinity.....	698,689
13.—Sierra.....	663,159
14.—Alameda.....	639,771
15.—Fresno.....	609,847
16.—Santa Barbara.....	528,438
17.—Butte.....	500,786
18.—Santa Clara.....	497,386
19.—Napa.....	493,100
20.—Ventura.....	476,161
21.—Inyo.....	430,589
22.—El Dorado.....	426,420
23.—San Diego.....	402,061
24.—Plumas.....	369,379
25.—Riverside.....	285,112
26.—Yuba.....	284,631
27.—Madera.....	268,467
28.—Sacramento.....	259,439
29.—Orange.....	259,174
30.—San Benito.....	205,650
31.—Marin.....	202,500
32.—Santa Cruz.....	191,091
33.—Lake.....	172,745
34.—Mariposa.....	171,516
35.—Sonoma.....	157,135
36.—Contra Costa.....	146,900
37.—Humboldt.....	118,827
38.—San Luis Obispo.....	85,626
39.—San Francisco.....	58,400
40.—San Joaquin.....	39,862
41.—Solano.....	24,700
42.—Tulare.....	21,566
43.—Stanislaus.....	21,405
44.—Lassen.....	20,483
45.—Monterey.....	19,175
46.—San Mateo.....	16,500
47.—Colusa.....	13,930
48.—Mendocino.....	8,448
49.—Kings.....	5,000
50.—Del Norte.....	3,483
51.—Tehama.....	2,200
52.—Yolo.....	1,760
Unapportioned.....	1,406,803
Total.....	\$32,622,945

CALAVERAS COUNTY.

A syndicate of Pittsburg, Pa., people has bought the Calaveras G. M. Co.'s mine and mill for, it is reported, \$40,000. Of this \$10,000 has been paid and the balance is due in twelve months.

The Melones G. M. Co., at Robinson's Ferry, has discontinued work underground pending the completion of the mill. The concrete foundation started several months ago is being completed.

A strike has been made in the Alpine mine, H. C. Swank owner, near Washington Ranch; 20 feet down ribbon rock was struck that is expected to mill \$125 a ton. The ledge is 4½ feet wide—22 inches of it very rich.

The Lockwood mill, at West Point, is running on good ore.

A. Brown, manager of the Lost Log mine, at Jenny Lind, has Supt. Phelps at work taking out the water. As soon as the shaft is free, a thorough investigation of the mine will be made.

EL DORADO COUNTY.

In the St. Clair mine, at Kelsey, drifting on the ledge at 100 feet depth is being done. The last clean-up paid well, so it is said.

At the Eureka slate quarry about fifty men are employed, and as soon as the two new hoists are installed about fifty more men will be added to the force. A large boarding and bunk house and several other buildings are being constructed and covered with slate.

The Zantgraft mine at Rattlesnake Bar has been closed down temporarily.

MONO COUNTY.

Work on the Castle Peak mine, near Bridgeport, is suspended temporarily during the absence of A. D. Cullom in London, to which place he has gone to put the mine into a stock company. The manager, J. J. Kermeen, is at the mines, and J. S. Cain of Bodie is owner's agent during his absence.

PLACER COUNTY.

Supt. Rodger has gone to Shady Run to commence operations at the Cedar Creek gravel mine. The main tunnel, now in 1200 feet, will be extended 400 feet.

A new bedrock tunnel has been started to tap the blue gravel channel in the Bob Lewis No. 2 at Damascus. It is expected that the channel will be reached in 1200 feet. Power to run machine drills is conveyed from the Red Point compressor plant. H. M. Jarvis is Supt.

SHASTA COUNTY.

The increasing number of copper matte smelting plants in Shasta county is making quartz mining there more profitable. The copper ores do not carry enough silica to make the proper slag mixture for the smelting. The gold-bearing quartz ores of the district of Shasta county closest the copper works are low grade and either unworkable by amalgamation or practically so. The Keswick smelter has been buying these ores, probably, of course, with reference to their gold and silver content, but the increasing smelting capacity and demand is making it necessary for the smelting companies to own the mines in order to insure the delivery of a sufficient quantity of the quartz. The amount of ores rich enough to tempt exploitation for direct profit is relatively too small to supply the smelter demand, so lower grade mines of large quantity are under consideration for purchase as a protection against the probable necessity of paying a bonus for silica when new smelters now under construction begin requiring more than the normally mined gold quartz ore. Among the mines under consideration for purchase by the Mountain Mines Co. at Keswick are the Texas mine in Old Diggings district, owned by the Bank of Tehama County, bonded by the Texas M. Co., which has been examined with a view to purchasing it at \$120,000; also the Reid mines, in the same district, owned by Reid, Clendenin & Salvane of Redding, Cal., bonded by D. McCarthy of Keswick.

The wire tramway from the Central mine to the Central mine spur, on the main line of the railway, is carrying ore from the Central, Evening Star, Mammoth and Reid mines. All of it goes to the Keswick smelter.

The South Fork D. Co. of Lowell, Mass., is driving on a 2900-foot long tunnel. The company has bonded and bought the J. P. Wright, J. K. P. Lewis and the Chicago group, on Chicago ridge. When this tunnel is completed it will tap the ore bodies of the Chicago after passing through the Wright and Lewis groups. The company is operating a double air compressor drill in driving the tunnel.

A. J. Bogard and E. J. Blossom of Red Bluff, Tehama county, have an eight months' bond from J. and O. Ames and F. Green on their mine near Harrison Gulch. They will construct a tunnel about 150 feet long to cut the ledge about 100 feet below the surface.

SIERRA COUNTY.

The Gibraltar gravel property, above Poker Flat, is soon to be reopened by the company owning it.

The new strike on the Amethyst location at the Black Bear quartz mine promises to be one of the biggest paying ledges in the section. It is a 23-foot ledge which carries gold all through it. It is south-west of the old Yellow Jacket works and a tunnel was run through it at one time. The mill, tracks and tramways are being repaired.

The Clinton & Clark ledge, on the North Fork of Salmon, above Sawyer's Bar, is reported to be from 40 to 50 feet in width, and gold can be seen with the naked eye in many places on the vein.

The Ruby drift mine at Forest has been bought by W. Wolf, who is building a stamp mill to crush both the cemented gold-bearing gravel and quartz from the ledge developed from its discovery in drifting in the bedrock gravel.

SISKIYOU COUNTY.

The Salmon River H. M. Co., operating the Meyers claim at Sawyer's Bar, is getting a good season's run. C. S. Fitch is manager. The company will have about two more seasons' run on this claim.

TUOLUMNE COUNTY.

V. Gianelli is in San Francisco to buy machinery for the Cable and Monitor mines, near Carters. A shaft is being sunk on the former and \$30 ore is being taken out. On the latter a tunnel that will cut the vein 40 feet down is being run. J. Heinberg is Supt.

YUBA COUNTY.

The debris impounding works at Degurre Point on the Yuba river will consist of several structures. The upper barrier will extend 40 feet above the present bed and entirely across it, a distance of 1000 feet. It will consist of gravel, cobbles, brush, rock paving and some masonry on its lower slope, a masonry crest and a double row of sheet piling in its toe. It will be built up gradually as the debris accumulates behind it, and is expected to hold coarse material. Barrier No. 2 of similar construction will be a half mile further down stream. It will have a 600-foot wide bypass and will not be as high as the other. The storage capacity of coarse material is estimated at 36,000,000 cubic yards. Two more barriers, and a settling basin for fine sediments are planned, the latter to hold 14,000,000 cubic yards. The total cost of the works, it is estimated, will be \$729,656.

COLORADO.

The United States Reduction & Refining Co. has been incorporated in Denver with capital \$10,000,000, of which \$4,000,000 is preferred stock and the remainder common. C. L. Tutt of Colorado Springs is president. The new company will amalgamate the Standard and the Colorado-Philadelphia smelters at Colorado City, and the Metallic, the Union and the National cyanide mills at Florence. The officers of both the United States Red. & R. Co. and the American S. & R. Co. deny that it is the intention of the two corporations to combine.

CHAFFEE COUNTY.

Pennsylvania people have incorporated the Huron Peak M. Co., capital \$125,000, to operate a mine of the same name on Huron peak. The officers are: J. F. Stine president, A. E. Stabler secretary, and W. Wallace manager. The company's property shows ore in four places, giving \$4 in gold and sixty ounces in silver. A tunnel of 135 feet has been driven on the ore. The company expects to be shipping ore soon.

GUNNISON COUNTY.

The Forest Hill Co., operating in Taylor park, has recently opened another body of ore, and L. Cavnah, president and general manager, is making arrangements to commence shipments. The new strike carries considerable zinc, but is rich enough to pay the penalty and leave a handsome margin of profit. The company is making an effort to secure the building of a road which will give it an outlet to the railroad.

HINSDALE COUNTY.

The Ohio group at Lake City has been sold to the Hotchkiss Mountain Co. for \$500.

LAKE COUNTY.

Henderson & Munro of Winfield have arranged with San Francisco parties to develop a group of fifteen claims by running a 3000-foot tunnel, cutting Mineral hill. A company has been incorporated by L. M. Turner of San Francisco, J. B. Henderson and H. Munro of Winfield. L. M. Turner is president. The company will also put in a 2000-foot tramway to the mill and build the latter.

SAN JUAN COUNTY.

It is said that the option held by the Boston syndicate of stockholders of Calumet and Hecla, Mich., on the North Star, on King Solomon mountain, will be taken up. The price is about \$200,000.

SAN MIGUEL COUNTY.

The Butterfly-Terrible statement of May operations gives the gross output at \$13,000; operating expenses, \$6500; net profit, \$6500.

SUMMIT COUNTY.

The Mecca G. P. M. Co. is hoisting rich bedrock gravel, two tests made on the richest streaks giving returns of \$130 to \$140 per cubic yard. The management is contemplating the installation of a hydraulic elevator plant this season.

TELLER COUNTY.

The production for June has been the lightest known for several months past and the grade of ore shipped, especially the smelting grade, has been extremely light. Even with the light ore production of the month the decrease in values amounted to only about \$300,000. The figures given out by the various reduction works and smelting companies are as follows:

Union.....	6,500	\$25.00	\$152,500
Economic.....	3,700	30.00	111,000
Dorcas.....	1,600	21.50	34,400
Colo.-Phila.....	18,000	40.00	560,000
Smelters.....	18,000	40.00	720,000

Total.....45,800 tons.....\$1,577,900

The Isabella Co. at Cripple Creek is reported to have leased two of its dumps, the old Smuggler dump to the Babbitt Bros., and Colonel Murray is to work the old Buena Vista dump. On the subject of dump leases there is quite an activity at

Cripple Creek. On Bull hill, between Independence and Altman, a number of operators are employed. Some have the cylinder washers, while others use the more primitive method of shoveling the waste rock into a small trough.

IDAHO.

BLAINE COUNTY.

Col. N. J. Sharp of Halley reports that he recently bonded the Copper Basin group of seventeen claims to J. W. Mackay of New York at \$155,000, and that the work of developing the property will begin at once.

IDAHO COUNTY.

G. Runkle, Supt. of the Lolo Pioneer G. M. Co.'s mines near Pierce City, reports that the company is preparing for the construction of a mill this summer. The Bitter Root claim has been developed 100 feet deep in crosscuts, showing the ore body 62 feet in width. The ore is entirely free-milling.

The Iron group of mines, on Newsome creek, has been bonded by G. S. Bailey and J. Justice of Clarkston for \$30,000. Bailey & Justice will begin development at once.

KOOTENAI COUNTY.

A rich ledge of free milling gold ore has been discovered at Tyson by J. Tyson, F. P. Mathews and A. C. Schroder. The new ledge is about 9 inches wide. As a result, general activity in quartz prospecting prevails and reports of lucky finds are plentiful, and beautiful specimens are being brought in. At the miners' meeting organizing the district, it was named Camas Cave mining district and the particular locality as Tyson. Tyson is about 1 mile west of the St. Maries river, 3 miles from Santo postoffice, 22 miles from St. Maries, at the confluence of the St. Joe and St. Maries rivers, and about 42 miles from Tekoa. There are two roads by which Tyson can be reached. One by the way of the O. R. & N. to Tekoa, and by conveyance from there to camp. The other is by way of Coeur d'Alene City, thence by boat over Lake Coeur d'Alene and up the St. Joe river to St. Maries and by stage 19 miles to Santo. The latter route is preferred by those who have passed over both roads.

LEMHI COUNTY.

Bausch and Deming have sold the Ore Cache group of mines to J. J. Cone of Canyon City, Colo. The group is on Carman creek and consists of ten quartz claims, eight placer claims and a 10-stamp mill. The ore is free milling, averaging from \$4 to \$6 per ton. The new management will continue operations and, if necessary, increase the capacity of the present plant. W. H. Robinson is superintending the work and R. Herndon is foreman in charge.

SHOSHONE COUNTY.

The Father Lode, near Sunset Peak, in the Coeur d'Alenes, has been sold to E. T. Le Clair of Minneapolis, Minn., C. G. Nielson of Sandusky, O., and associates.

MICHIGAN.

HOUGHTON COUNTY.

The Calumet & Hecla Co. is said to be introducing a policy of rigid economy. The company employs a large force of chemists and assayers constantly, and devotes one head of stamps at its mill to experimental work. In spite of all this approximately three-fourths of 1% mineral, or fifteen pounds to the ton, it is said is lost in tailings. This is more copper than is contained in the rock which is mined and treated at a profit by some of the other companies. The Kearsarge lode is supposed to outcrop near the eastern boundary and underlie the entire Calumet property. No attempt has yet been made to ascertain the value of this deposit. If it is as rich in this mine as in the Wolverine and Mohawk it will insure the Calumet & Hecla at least a century more of life.

MONTANA.

BEAVERHEAD COUNTY.

The Chrystal Graphite Co. of Kansas is developing a graphite mine near Dillon. P. Smith is president and has been superintending the work. The vein varies from 12 inches to 3 feet in width.

JEFFERSON COUNTY.

M. Bradley & Co. have bonded the Surprise mine to C. J. Pruett of Whitehall and S. R. Fair of Butte, who have erected machinery on the property preparatory to sinking.

Owsley & Prickett, who have a bond on the Baltimore copper group, have 11 feet of copper and silver ore and have shipped eight cars during the month. The shaft is only 40 feet deep.

LEWIS AND CLARKE COUNTY.

T. J. Connor is working on the 1200-foot tunnel on the Merrill group, which will have a depth of 350 feet at the face when

in the ore. Men have been employed for over a year in taking out water rights and ditches on the Little Blackfoot to provide power for the working plant. The plan is to build a ditch that will give several hundred feet fall, generate electrical power for transmission to a mill site at the mines, where a large mill capable of treating several hundred tons a day will be erected. This mill will probably have to be built on the Basin side, 2 or 3 miles down from the mine, and a narrow-gauge railroad built to connect the mines with the mill. The principal owners now are the McLures of St. Louis, F. A. Heinze of Butte, and J. Breen of Spokane.

MISSOULA COUNTY.

The Blue Wing M. Co. has incorporated at Wallace, with a capital stock of \$100,000, to work mines near Saltese. F. F. Johnson, H. J. Rossi and S. Seidenfeld of Wallace, Idaho; H. R. Allen of Spokane, Wash.; and F. Fichault of Saltese, Mont., are directors.

NEVADA.

HUMBOLDT COUNTY.

W. E. Lampson of Foltz has made a cyanide run of 210 tons of tailings from the old Bonanza mill. The tailings assay \$2.65 per ton, and Mr. Lampson reports extraction up to \$2.15 per ton. There are 3000 tons of tailings.

The U. S. Land Office at Carson is hearing a contest over the title of the Emmons iron mines near Lovelock. Mr. Emmons has worked these mines a number of years, but it appears that the claims are on odd numbered sections reserved for the railroad. The grant excludes mineral lands, except iron and coal. Mr. Emmons relies upon the showing that there are other minerals besides iron on the land.

LANDER COUNTY.

The mines of the New Pass M. Co. have been bonded by W. F. Snyder and associates of Salt Lake City, Utah. Under the option the syndicate undertakes to pay a purchase price of \$250,000.

WASHOE COUNTY.

The first steam hoist in Wedekind, Reno's mining suburb, has been started up. The hoist is of 80 H. P. and is over the new Bell shaft. A building is being erected over the machinery.

NEW MEXICO.

COLFAX COUNTY.

The Smithfield G. M. & M. Co. of Pittsburgh, Pa., operating on the Senate-Bobtail and Abe Lincoln, near Elizabethtown, have opened an 18-inch lead averaging over \$100 per ton, and are putting in new pumps preparatory to further sinking.

The Ohio M. & M. Co., M. Walsh manager, have 18 feet of ore which averages \$16 to the ton, on the Denver claim at Elizabethtown. Larger pumps are to be put in.

The Legal Tender M. & M. Co., O. F. Matkins manager, have renewed operations in Willow gulch near Elizabethtown.

GRANT COUNTY.

A copper strike on one of the Dorsey & Kowloon group of mines, adjoining the Houston & Thomas mine, Pinos Altos district, is reported. In crosscutting 12 feet at the 60-foot level a 36-inch vein was cut, averaging, it is said, 36% copper, malachite and native.

SANTA FE COUNTY.

The Santa Fe G. & C. M. Co., at San Pedro, is running smoothly; J. T. McLaughlin is Supt. The company owns at San Pedro its copper mines and also owns an iron mine to supply flux. Coke is brought from Colorado. The ore is brought from the mine over a gravity tramway. The plant cost over \$100,000. About 300 men are employed and the monthly pay roll is \$12,000. The smelter product is hauled to Ortiz station, about 18 miles.

OREGON.

BAKER COUNTY.

The North Pole mine, of which E. Melzer is manager and J. P. Fox superintendent, is situated on the northern section of the well-explored ore belt that runs through the Cracker Creek district, near Sumpter. The mine is well developed and produces a regular tonnage. It is opened through a system of tunnels which give a working depth of about 1000 feet on the vein. The lower or No. 1 tunnel cuts in on the strike of the vein 2200 feet. Tunnel No. 2 is 450 feet above No. 1 and cuts 1400 feet in the same direction. The two are connected by an upraise that starts in No. 1 at a point 1300 feet from the entrance. Near the breast of No. 2 an upraise leads to a blind level 100 feet above. The latter is 600 feet long. Near the northern extremity of the blind level an upraise of 170 feet opens into tunnel No. 3, the latter going in 900 feet. From No. 3 there are four upraises, 120 feet apart, which go to the surface, and between these raises the ore has been pretty thor-

oughly stoped out and milled. The stoping also extends to the other ground between No. 3 and the blind level. Above No. 3 the ores have been well oxidized and it is this class that has kept the mill going a number of years. On and below the blind level the ores are a sulphide of iron, carrying gold values, and from now on this class of ore will be mined and mixed with the oxides and milled. The ore will pass through the battery, resulting in slimes, fines and coarse product. The slimes, which result from the oxides, will pass to cyanide leaching tanks; the fines to the Wilfley tables and the coarse to a Huntington grinder. The slimes produced by the Huntington will also go to the cyanide vats, the coarse returning to the tables. By this method it is claimed 60% of the values are saved by cyanide and the balance in concentrates. The final table tailings, however, are recyanidated. The mill will now run seventy tons of ore per day.

South of the North Pole, some distance, is the E. & E. mine, which has been idle for two years, but which may resume operations this season. South of this is the Columbia group, in charge of F. S. Baillie. The 600-foot shaft here has been enlarged to three-compartment and a station pump set at the 500-foot level. The shaft is being sunk deeper. The Columbia 20-stamp mill, with plates and twenty Johnson vanners, is operating by water power on about seventy tons of ore per day. The object of so many tables is to effect numerous reconcentrations. The final mill tailings are passed to a tailing plant, where they are subjected to cyanide leaching. Of the gold values in the ore about 40% are saved on the plates. The concentrates run about 32% silica and 25% iron. Their concentrate values will run about \$350 per ton. The ores milled here are taken from below the line of oxidation, the oxides remaining in the upper levels.

The Golconda mine and mill, which adjoin the Columbia, are being operated, the management of which declining to give any information as to development, equipment or production.

Three miles southward, on apparently the same general zone, is the Mammoth group, developed by a 200-foot tunnel to the ore ledge, with several hundred feet of drifting on the latter in ore. This work shows the vein to be of considerable thickness, standing between a granite hanging wall and a slate foot wall. The ore, comprising an iron and arsenical sulphide, with considerable quartz bearing free gold, runs in shoots through a slate and decomposed granite gangue. The sulphides run heavy in iron and silica. The walls are inclined to swell and crush in the timbers. Stoping along the vein three sets high has extended 250 feet and two sets high for 80 feet in the opposite direction. A mill, equipped with crusher, Bryan grinder, plates and concentrators, is operating on about twenty-five tons of ore per day. N. K. Remington, mine foreman, states that about 80% of the saving is effected by amalgamation. The property is under the general management of H. S. McCallum. WASCOTT, Bourne, June 28.

Two prospectors have brought specimens of rock showing opal of all shades into Baker City. The rock is float, and besides opal carries gold in several places.

GRANT COUNTY.

The Gold Bug Grizzly, near Granite, is working fifteen men, putting in a hoist and developing the mine, preparatory to building a 10-stamp mill this season. J. Helberg of Spokane is associated with J. Hennessy, the superintendent, in the property.

F. Kelly, owner of the Reco mine in British Columbia, has bonded the Oro Grande claims, adjoining the Alamo mine, from M. Munroe, and also the Jack Martin group at Robinsonville.

SOUTH DAKOTA.

LAWRENCE COUNTY.

The secretary and general manager of the Niagara Tin M. Co., with experts, are looking over their property, near Lead. The company owns eighty acres, through which tin-bearing ledges run. It is claimed that an average of 3% tin has been obtained by mill runs from some of the larger veins.

PENNINGTON COUNTY.

A 50-ton cyanide mill is projected at Deadwood for the treatment of the low-grade ores produced by mines owned by H. A. Wattson, F. D. Sanders, B. Rogers and J. Wattson. The latter is superintendent of the operations.

UTAH.

JUAB COUNTY.

The Centennial-Eureka employs 260 men at the mine and keeps up a steady record as a producer. In earlier years, when the product came from above the 400-foot level, the ores were mainly gold

and silver bearing, carrying a small percentage of iron and no copper; but from and including the fourth level downward they have become a copper and iron sulphide, carrying an average of 6½% copper, one ounce gold, thirty to forty ounces silver, 4% to 5% iron, 68% to 75% silica and about 1% sulphur. The lead values here are light. In shipments of 40,000 tons of ore only about 700 tons of lead have resulted. The shaft is 1600 feet deep, being 800 feet off the ore body. The ore is in a vertical fissure which stands about 90 feet between walls, though this is interrupted in places by the intrusion of country rock. As an illustration of the extent of the ore and the character of the work, it may be cited that in one stope between the fourth and fifth the chamber worked out is 250 feet long, 150 feet wide and about 100 feet high, and contains 2400 square sets. On the sixth level a new ore shoot was recently struck, wherein the ore runs high in gold, silver and iron, but low in copper. This shoot was 200 feet off from the main ore body, but running parallel with it.

On the main seventh a winze sinks 110 feet in ore to an intermediate level, connecting with a second winze that goes down 80 feet in the same ore shoot. The idea is to raise from the 10th and connect with these winzes. Ore is being taken from practically all the levels from the 200 down to the twelfth. Drifting proceeds from the twelfth and fourteenth for the ore bodies.

Centennial-Eureka ores have never been milled, the better grades having been shipped to the smelters. There are about 55,000 tons of \$20 ore on the dump that will doubtless be handled in the near future. Interest attaches to the Centennial-Eureka now to an unusual extent on account of its virtual consolidation with the U. S. group of Bingham, and the immediate prospect of the construction of a 1000-ton smelter to handle the ores from both groups. C. E. Allen is general manager of the Centennial-Eureka and R. A. Brown superintendent.

The May Day ships from two to four cars per week of first-grade ore to the smelter, reserving the lower grades for milling. The ore averages 12% lead, \$2 gold and fifteen ounces silver. The ore is partially oxidized, though a large per cent is sulphide. The mine is worked through a tunnel which goes in 900 feet, all the work in ore being below the tunnel level, this work including two or three winzes, one of which is 200 feet deep.

The May Day mill for dry concentration will soon be completed. It will comprise crushers, rotary drier, automatic feeders, fine crushers, rolls, Crown sizers, screens and Crown concentrators. There are ten Crown sizers made up of a system of screens having a revolving motion. These machines size from one to another. There are four of the concentrators. The plan of the concentration is to get the entire product down to a uniform degree of fineness, the lighter particles being carried away by currents of air, the heavier, which contain the values, being carried safely through the agitated medium and saved. It is the old idea of gravity, with air instead of water as a vehicle for carrying away the refuse. The construction is in charge of F. P. Hanson of the engineering firm of E. B. Rogers & Co. of San Francisco. The result of the operations of this mill will be watched with much interest.

EUREKA, June 24.

Jesse Knight has sold the Uncle Sam and neighboring claims on Godiva mountain, at Tintic, to the Uncle Sam-Humbog M. Co., for \$500,000.

SALT LAKE COUNTY.

The Park Valley G. M. Co. has incorporated; capital stock, \$5000. J. H. Featherstone is president, J. L. Perkes secretary and W. A. Byers treasurer of the company.

TOOELE COUNTY.

The Con. Mercur G. M. Co., Mercur, produced \$137,500 gold in May. During June there has been milled 28,000 tons of ore, or an average of over than 900 tons daily. The battery record shows a perceptible increase in the average value of the ore. At the Mercur mill at Manning 600 tons of tailings daily are being treated that average \$2.27 gross.

WASHINGTON.

The Forty-five mine, near Silverton, on the Monte Cristo Railroad, has been provided with an aerial tramway 13,800 feet long, which will soon be operating. The ores here are an iron and lead sulphide, carrying gold, silver and lead values.

The Sunset mine, near Index, has a surface tram line 6½ miles long, extending from the mine to the railroad. The development consists of a tunnel, with 300 feet of drifting on the vein. A new tunnel, 100 feet below that originally driven, is now being pushed in, which is expected to cut the ledge at a point 500 feet from the entrance and at a vertical depth of 350

feet. This property belongs to a company in which J. E. McManus & Son of Seattle are interested. It is stated that some months ago fourteen cars of ore from this mine were shipped that ran 9% copper and one car that ran 332 per ton. The ores are largely a bornite. It is asserted that 300,000 tons of ore are blocked out and that a concentrating mill will doubtless be erected.

The company owning the Ethel mine, in same locality, have decided to erect a concentrating mill on their property. Theirs is also a bornite and chalcopryite ore.

FERRY COUNTY.

The Congress mine on the south half of Collville reservation is a nickel mine. J. H. Hopkins, manager, says: "An assay from the No. 5 level ledge, 32½ feet wide, showed values of \$165 in nickel and cobalt. There is copper in the ore with the nickel, at times a large percentage."

OKANOGAN COUNTY.

The Washington & Great Northern Railway has been incorporated to build through the Okanogan valley to Republic. The incorporators are J. J. Hill, president of the Great Northern; T. Burke, W. H. Thompson, E. Sawyer and M. G. Grover, general counsel for the Great Northern. The new road will give railway transportation to Republic, Methow, Grand Forks, Loomis and Boundary creek. The road will be 250 miles long and cost \$9,000,000.

STEVENS COUNTY.

A discovery of a gold quartz ledge in the northeastern section has been made by E. E. Hall of Ione. A large number of men have been engaged opening a trail from the Pend d'Oreille river to the ledge—18 miles.

FOREIGN.

BRITISH COLUMBIA.

Mr. Graves of the Miner-Graves Syndicate is quoted as saying: "We are still looking into the refinery proposition. The first step on our part would be the construction of a smelter. After this was in good running order for, say, six months, we would have a better idea of the field for a refinery. I anticipate that the question of constructing the smelter at the coast will be determined within sixty days. In event of its being decided to go ahead with the smelter, a year would have to elapse before the enterprise could be completed and in thorough running order, and another six months would pass before we fully determined as to the refinery, so that the matter is very much in the future as yet."

Ore shipments from Rossland are beginning to be affected by the Northport trouble. All stopping and sorting has been stopped at the Le Roi, the Le Roi No. 2 and the Rossland-Great Western. The total output for week ending June 21 was 6695 tons and total for year to date 201,597 tons.

Among late discoveries in Cassier district is a sulphur mountain, situated on Hucklestone river, near Port Essington. It contains a large percentage of sulphur and carries some gold, copper and silver as well. The owners are J. Bryden, Mr. Swinnerton and some others of Port Essington, who say they are now filling orders for 60,000 tons of the ore. A tramway from the mine to the river is being constructed and flat-bottomed steamers will convey the ore down the Hucklestone to Port Essington, the shipping port.

NEW SOUTH WALES.

The return to the Department of Mines shows gold yield for April of \$425,000, as compared with \$270,000 for March. For the first four months of 1901 the yield is valued at \$1,400,000, as compared with \$2,150,000 for the corresponding period last year. The quantities and value of silver, copper, tin and coal exported from New South Wales during the first quarter of 1901 are:

	Quantity.	Value.
Silver, ingots and matte.....	123,519 ounces	\$70,000
Silver - lead and ores.....	101,895 75 tons	2,700,000
Copper, ingots, matte and ore..	1,713.6 "	550,000
Tin (ingots and ore).....	211.8 "	122,000
Coal, exported to foreign and intercolonial ports	830,351 "	1,960,000

This is an increase of \$570,000 over the corresponding period of 1900, coal being the principal item of increase.

QUEENSLAND.

The mining opal field at Opalton, in Western Queensland, has been restricted by the drought, only about thirty miners working. Some large blocks of very valuable opal have been found. Up to date the value of the opal mined in Queensland is estimated at \$1,250,000.

THE KLONDIKE.

John Doyle, formerly of Butte, Mont., who is mining 6 miles from White Horse in Yukon territory, writes that the district is very promising. He has four quartz claims through which a ledge 40 feet wide passes. The ore carries gold and copper, the latter predominating.

Commercial Paragraphs.

THE American Engineering Works of Chicago have closed a contract with the Modoc Mining Co. of New Mexico for their new concentrating plant, including crushers, rolls, screens, jigs and power plant.

C. O. BARTLETT & Co. of Cleveland, O., are erecting one of their special four compartment dryers for the Lakefield & Portland Cement Co., Lakefield, Ont., for drying 100 tons of coal per day. Also for the Wetter Steel Sand Co., Massillon, O., for drying 200 tons of sand per day. They are also in receipt of an order from the Diamond Wall Cement Co., Williamsport, Pa., and one from the Empire Cement Co., Warners, N. Y.

THE Stilwell-Bierce & Smith-Vaile Co., Dayton, Ohio, recently shipped one of their 27-inch improved cylinder gate Victor turbines, mounted on a horizontal shaft in a wrought iron flume, to the North Carolina Electrical Power Co., Marshall, N. C. The wheel was made entirely of bronze, and under 60 feet working head of water will develop 750 horse power. This power will be used for driving the plant of one of the street railways of Asheville, N. C. The shipment also included 70 feet of steel feeder pipe, three sets of headgate irons, and the necessary water rack.

THE New Process Raw Hide Co., Syracuse, N. Y., reports the export sales of its new process noiseless pinions as rapidly increasing. The company has shipped 100 electric railway pinions for G. E. 800 H. P. motors to London on an order from an electrical supply house in that city. The pinions are to be used on one of the big railways recently built there. A shipment of pinions has also been made to the Albion Motor Co., a big English automobile company. In the general machinery line the company has just shipped a number of big bevel gears, both iron and raw hide, some of the latter as large as 32" diameter, to a big English shipbuilding concern. A number of railway pinions have been shipped to Germany and Norway, and reports from those countries say that the demand for them is increasing. Several inquiries for catalogues and prices have lately been received from Japan. A good sized order is in process of construction for one of the mines at Kalgoorlie, Australia.

THE A. Merle Co. is the successor of the San Francisco Novelty & Plating Works, who occupied the building N.W. corner First and Mission Sts., San Francisco, for the past fifteen years, and known for the quality of their work and accuracy of weight of their silver-plated mining plates for saving gold. Their orders for mining plates and artistic metal work have increased within the last three years; they are now sending mining plates to mines and foundries in this country, Mexico, South America, Australia, British Columbia, China and Corea. They have built an extensive plant, fronting on Bay, Stockton and North Point streets, San Francisco, thus giving them a floor surface of over 80,000 square feet for the entire factory and over 8000 feet for plating plant. They also do all kinds of copper, nickel, brass and gold plating. They are able to furnish gold mines with silver-plated plates at lowest rates and guarantee weight. A visit to their office and show rooms, No. 515-519 Mission St., San Francisco, is invited. Visitors to their plating plant, with a permit from the office, will always be welcome.

FOLLOWING is an extract from a communication received by the Smooth-On Mfg. Co., Jersey City, N. J.: "Gentlemen:—Upon looking over your advertisement this morning it brought to mind a successful experiment on my part in the use of your Smooth-On Compound, the nature of which you have probably never known. I was at the time in the employ of the Virginia-Carolina Chemical Co. I had the Kehoe Iron Works here telegraph an order for twenty-five pounds. The experiment was this: In all fertilizer works they use what is called acid eggs (sulphuric acid) and the acid eats holes in them very rapidly. We had one that had been thrown away as no good on account of the holes and had ordered a new one, but it was delayed, and we were about to get into a hole and suffer quite a loss. Having used your compound several times for sand holes and fractures, I concluded that I could patch the old egg and save the company a few hundred dollars, so after receiving the can of compound I went to

work and fixed the old egg, and it is running to-day under sixty pounds pressure. This experiment happened about five months ago. The new egg has been laid aside for future use. The head chemist here said it would never do, so did two other chemists. They showed me by tests that the acid would eat it up. So it did in the dry state, but after mixing it with water and putting it on in the usual state and allowing the cement to metallize the acid had no effect upon it. Some of the holes were as large as your finger and clear through. Our chemist said that he had seen all kinds of ways tried to stop holes in acid eggs and that was the first time he had ever seen an egg used the second time. Yours truly, F. A. Lawyer, Chief Engineer, Savannah, Ga."

Personal.

W. H. W. HAMILTON of Sumpter, Or., goes on a ninety-day visit to England.

P. J. HICKEY, manager of the Ivanhoe mine in the Slocan, B. C., is in Spokane, Wash.

O. A. TURNER of Grass Valley, Cal., will manage the Tonopah mines, Nye county, Nev.

W. B. HANCOCK, manager of the Boston & Seven Devils Copper Co., Idaho, is in Portland, Or.

J. D. HUBBARD, metallurgist of the Ball mine, Siskiyou county, Cal., is sojourning in San Francisco.

E. P. JENNINGS of Salt Lake City, Utah, is in Canada examining a large mining proposition.

F. L. GARRISON, M. E., who has been in Boise, Idaho, for some time, has returned to Philadelphia, Pa.

THOMAS MARSHALL of the North Star mine, Grass Valley, Cal., has returned from an extended trip to Europe.

H. DE C. RICHARDS, manager of the Orleans Bar hydraulic mine in Humboldt county, Cal., is in Grass Valley, Cal.

JOSEPH GRAVELLI, late of Quartz, Tuolumne county, Cal., is now foreman of the Yellow Aster mill at Randsburg, Kern county, Cal.

W. R. ERSKINE, C. E., of Denver, Colo., is in San Francisco en route home from Ecuador, where he has been engaged in railroad construction.

WM. OGILVE, who recently resigned as Governor of Yukon Territory of Canada, has been offered the position as commissioner in the Alaska boundary dispute.

F. C. FENNER has retired from the management of the Lowell & Arizona C. M. & S. Co. mines at Bisbee, Arizona, with the transfer of the properties of that company to the Copper Queen M. Co., but will remain at Bisbee for some time.

Catalogues Received.

The Crane Co. have published a new edition of their list circular, giving dimensions of flanged and other fittings and gate valves. They have changed some of the measurements so that in ordering on pipe plans it is necessary to do so from the new edition, which they will be pleased to mail on request, of the main office in Chicago, Ill., or any of their many branches.

The San Francisco Oil Exchange Directory of the Pacific Coast has been published by the Charles W. Palm Co. of Los Angeles, Cal. It is an excellent up-to-date compilation of all the oil companies operating in California, maps and descriptions of districts, and digests and extracts of California, Arizona and U. S. laws affecting the industry. It will be found useful to those engaged in the industry.

The New York & Franklin Air Compressor Co. has issued a new catalogue, describing the latest types of the New York-Franklin air compressors, designed to provide air for the operation of pneumatic shop tools, mining, and other purposes. The catalogue is attractively illustrated and contains much valuable information relating to the structure and installation of air compressing machinery. It will be mailed on application to the New York & Franklin Air Compressor Co., 95 Liberty St., N. Y.

Recently Declared Mining Dividends.

	Payable.
Napa Con. Q. M. Co., California, quarterly, 10 cents per share.....	July 1
New Idria Q. M. Co., quarterly, 10 cents per share.....	July 1
Amalgamated Copper Co., Montana, quarterly, 1½¢, extra ½¢, \$1,500,000.....	July 29
Utah M. Co., Utah, monthly, 2 cents per share, \$2000.....	June 27
Tomboy G. M. Co., Colorado, No. 4, \$95,000.....	July 14
Bunker Hill & Sullivan M. & Con. Co., Idaho, \$21,000.....	July 4

Latest Market Reports.

SAN FRANCISCO, July 3, 1901.

SILVER.—Per oz., Troy: London, 27½d (standard ounce, 925 fine); New York, bar silver, 59½c (1000 fine); San Francisco, 59½c; Mexican dollars, nominal San Francisco, 47c New York.

COPPER.—New York: Lake, 1 to 3 casks, \$17.25; carload lots, \$17.00; Electrolytic, 1 to 3 casks, \$16.75; carload lots, \$16.62½; Casting, 1 to 3 casks, \$16.60; carload lots, \$16.50. San Francisco: 18. Mill copper plates, 20c; bars, 22@23c. London: £67 8s 9d per ton.

While the open quotations at New York remain unchanged, it is reported that a premium has been paid for spot delivery, some of the refineries being behind with the filling of orders.

LEAD.—New York, \$4.37½; Salt Lake City, \$4.00; St. Louis, \$4.32½; San Francisco \$4.90, carload lots; 5½¢ 1000 to 4000 lbs.; pipe 6, sheet 6½, bar 5½¢; pig, \$5.25. London, £12 5s 9d per ton—2.60 cents per lb.

SPELTZ.—New York, \$4.20; St. Louis, \$3.75; London, £16 2s 6d per ton—3.58¢ cts. per lb.; San Francisco, ton lots, 5½¢; 100-lb lots, 6c.

ANTIMONY.—New York, Cookson's, 10c; Hallett's, 9c; San Francisco, 1000-lb. lots, 10c; 300 to 500 lbs., 11c; 100-lb. lots, 13@15c.

IRON.—Pittsburg, Bessemer pig, \$15.20; gray forge, \$14.25; San Francisco, bar, per lb., 2.65c in small quantities.

STEEL.—Bessemer billets, Pittsburg, \$25; open hearth billets, \$27.00; San Francisco, bar, 7c to 12c per lb.

TIN.—New York, pig, \$26.00; San Francisco, ton lots, 30c; 1000 lbs., 30½¢; 500 lbs., 30½¢; less, 31c; bar tin, \$3.35c.

QUICKSILVER.—New York, \$51.00 large lots; London, £9 2s 6d; San Francisco, local, \$48.00 per flask of 76½ lbs.; Export, \$45.00.

MAGNESIUM.—New York, \$2.90 per lb.; San Francisco, \$3.75.

ZINC.—San Francisco, 5½¢; slab, 5½¢; bar, 7c; zinc dust, N. Y., 8c.

BABBITT METAL.—San Francisco, No. 1, 10c.

SOLDER.—Half-and-half, 100-lb. lots, 19c; San Francisco, Plumbers', 100-lb. lots, 15½¢.

PHOSPHORUS.—F. o. b. New York 50@60c per lb.

ASSAY LITHARGE.—San Francisco, 10c per lb. small lots.

BISMUTH.—New York, \$3.25 per lb., 50-lb lots; San Francisco, \$2.50 to \$2.75 per lb.

PLATINUM.—San Francisco, crude, \$22 per oz.; New York, \$22 per Troy oz. FERRO-MANGANESE.—Pittsburg, 80%, domestic, \$58.50, large lots.

ALUMINUM.—New York, No. 1, 99% pure ingots, 35c; No. 2, 90%, 30c to 35c.

POWDER.—F. o. b. San Francisco: No. 1, 70% nitro-glycerine, per lb., in carload lots, 15½¢; less than one ton, 17½¢. No. 1*, 60%, carload lots, 13½¢; less than one ton, 15½¢. No. 1** 50%, carload lots, 11½¢; less than one ton, 13½¢. No. 2, 40%, carload lots, 10c; less than one ton, 12c. No. 2* 35%, carload lots, 9½¢; less than one ton, 11½¢. No. 2** 30% carload lots, 9c; less than one ton, 11c. Black blasting powder in carload lots, minimum car 728 kegs, \$1.60 per keg; less car lots, \$2 per keg.

CAPS.—3x, \$5.50 per 1000; 4x, \$6.50; 5x, \$8; Lion, \$9, in lots not less than 1000.

FUSE.—Triple tape, \$3.60 per 1000 feet; double tape, \$3.00; single tape, \$2.65; Hemp, \$2.10; Cement No. 2, \$3.00; Cement No. 1, \$2.65, in lots of 3000 feet and up.

CANDLES.—Granite 6s, 16 oz., 40s., 10½¢ per set; 14 oz., 40s., 9½¢.

OILS.—Lined, pure, boiled, bbl., 75c; cs., 80c; raw, bbl., 75c; cs., 78c. Deodorized Stove Gasoline, bulk, 14½¢; do., cs., 20½¢; 86° Gasoline, bulk, 20c; do., cs., 26c; 65° Naphtha or Benzine, deodorized, in bulk, per gal., 13½¢; do., in cs., 19½¢; Lard Oil, Extra Winter Strained, bbl., 75c; cs., 80c; No. 1 bbl., 50c; cs., 55c. Neatsfoot Oil, cooper's bbls., 60c; cs., 65c; No. 1 bbl., 50@52½¢; cs., 55@57½¢.

CHEMICALS.—Cyanide of potassium, 98%-99%, jobbing, 32½¢ @ 33¢ per lb.; carloads, 30¢ @ 31c; in 10-lb. tins, 40c; sulphuric acid, in carboys, 66½¢ B, 2c per lb.; soda ash, \$1.90 per 100 lbs. 58%; hyposulphite of soda, 2½¢ @ 3c per lb.; blue vitriol, 5½¢ @ 6c per lb.; borax, concentrated, 7@8c per lb.; chlorate of potash, 12@13c; roll sulphur, 6c; alum, \$1.90@2.00; flour sulphur, French, 24¢ @ 2½¢; California refined, 1½¢ @ 2c; nitric acid, in carboys, 8c per lb.; caustic soda, in drums, 3@4c per lb.; Cal. s. soda, bbls., \$1.00; sds, 95¢ per 100 lbs.; chloride of lime, spot, \$2.50@2.60; nitrate of potash, in kegs, 8c; caustic potash, 10c in 40-lb. tins.

COAL.—San Francisco, coast, yard prices: Wellington, \$9; Seattle, \$7.00; Coos Bay, \$5.50; Southfield, \$9.00. Cargo lots, Eastern and foreign: Wallsend, \$8.00; Brymbo, \$7.50; Pennsylvania, hd., \$14.00; Scotch, \$8; Cumberland, \$12; Cannel, \$9.50; Welsh Anthracite, \$12.00; Rock Springs, \$8.50; Colorado Anthracite, \$14.50. Coke, \$16 per ton in bulk; \$18 in sacks.

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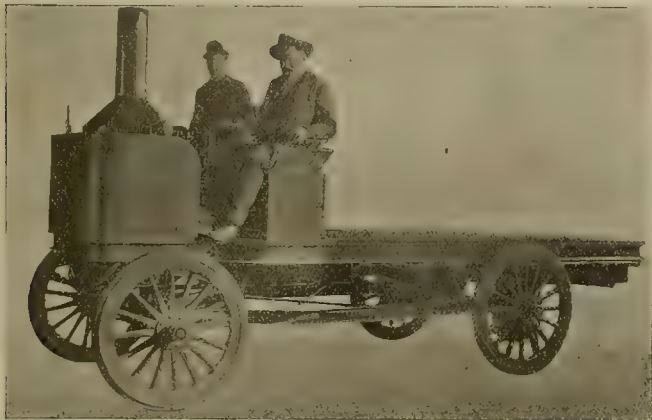
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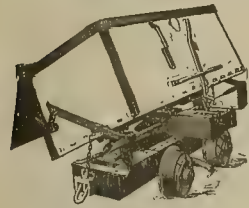
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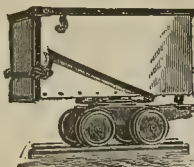
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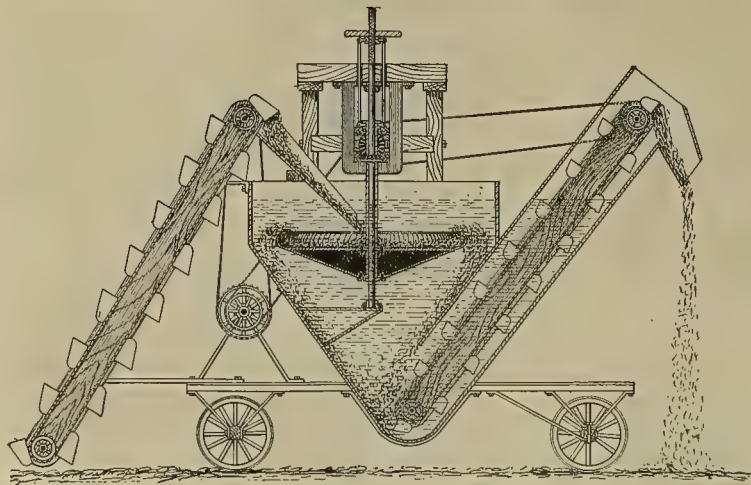
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The capacity of the "Wonder" Placer Machine is its most surprising feature. No other placer machine ever invented can approach it either as a gold saver or in handling the ground.

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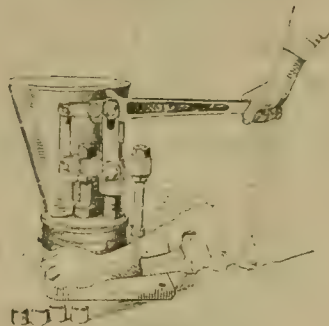


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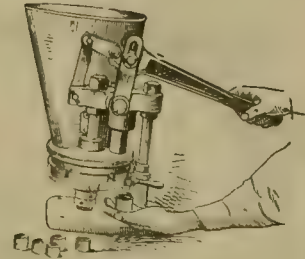
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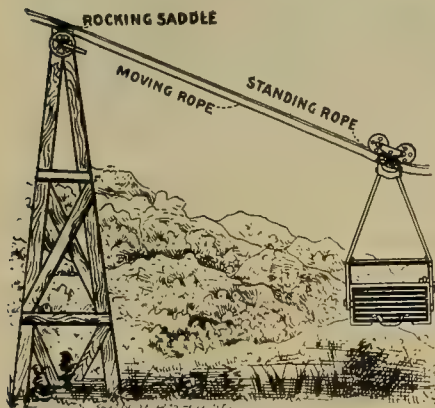
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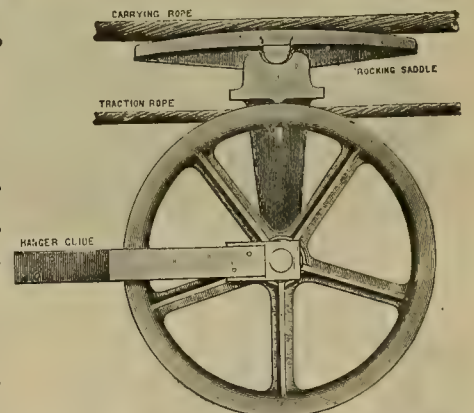
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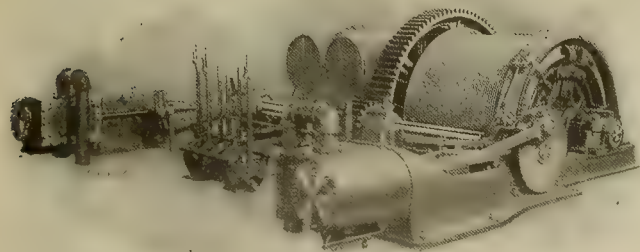


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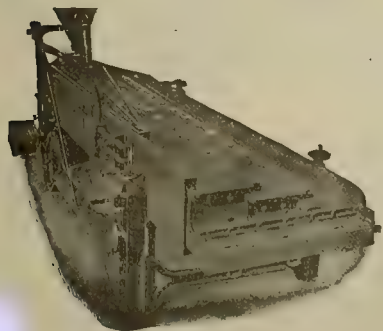
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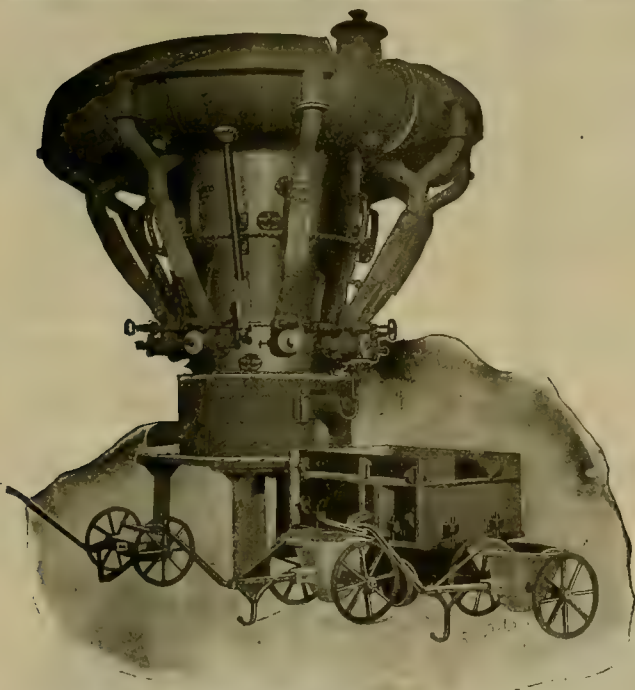
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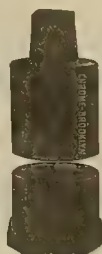
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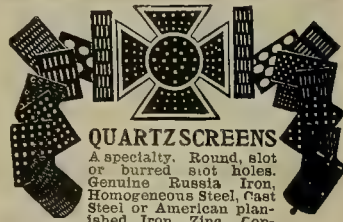


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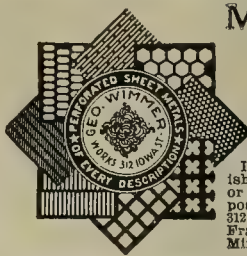
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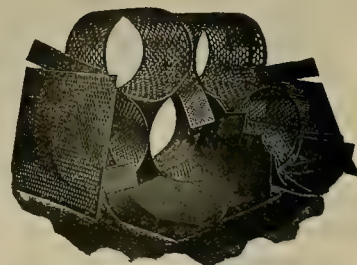
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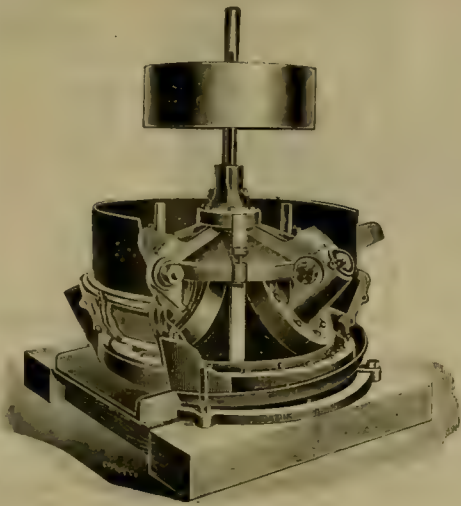
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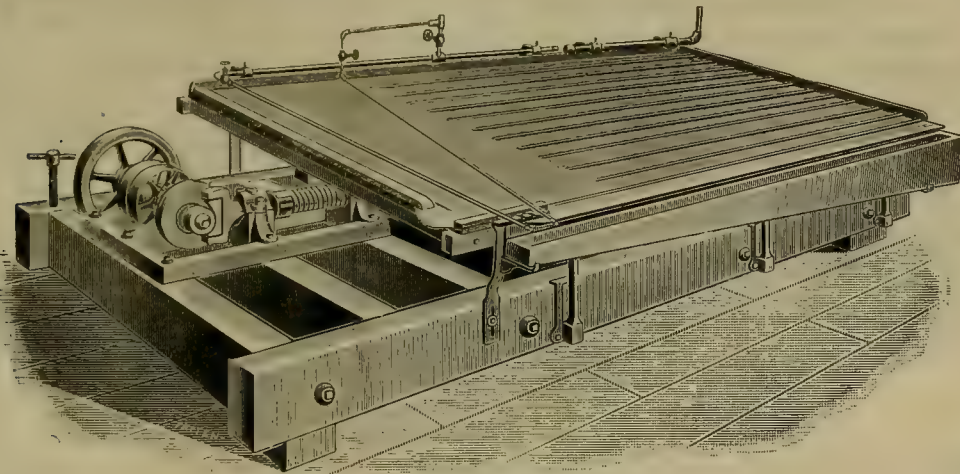


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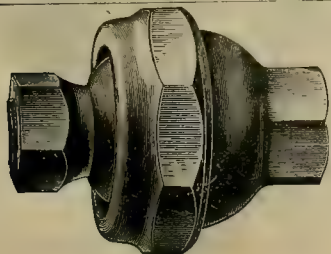
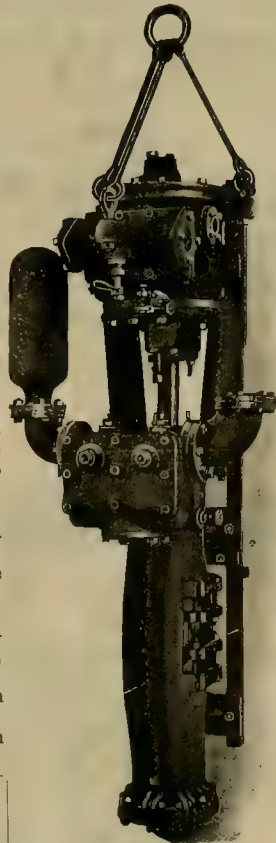
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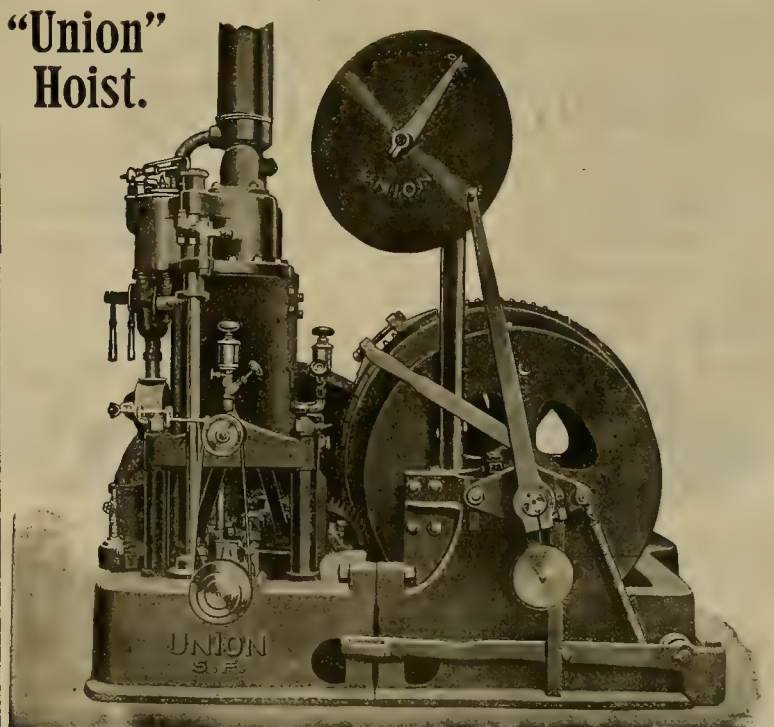
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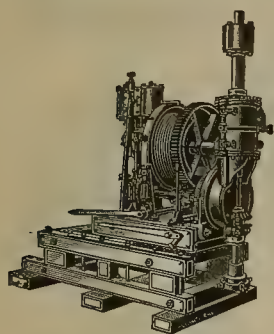
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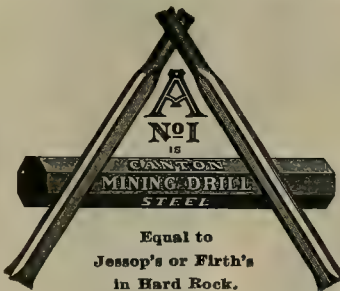


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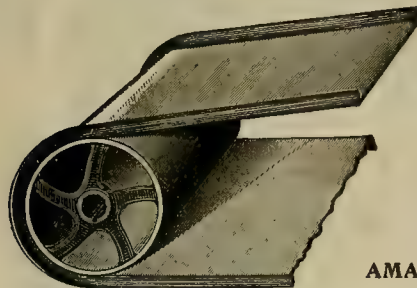
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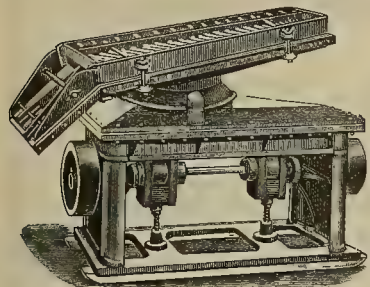
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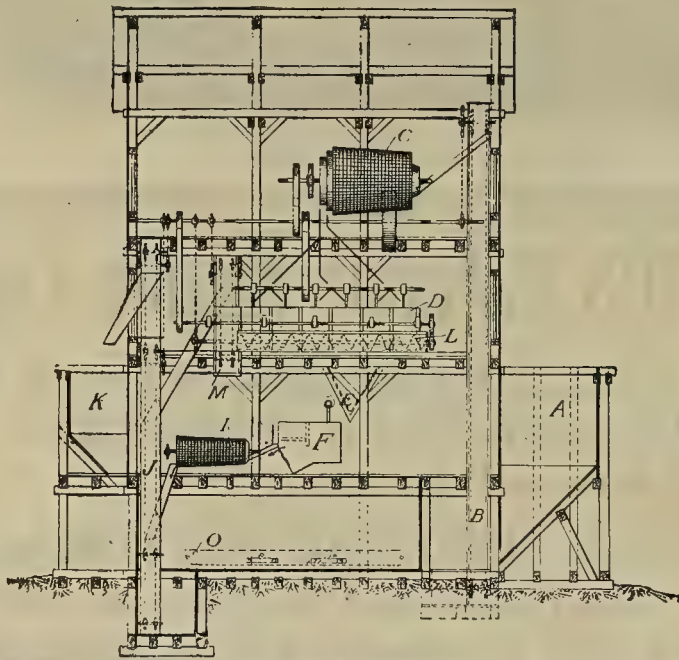
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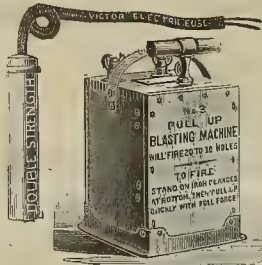
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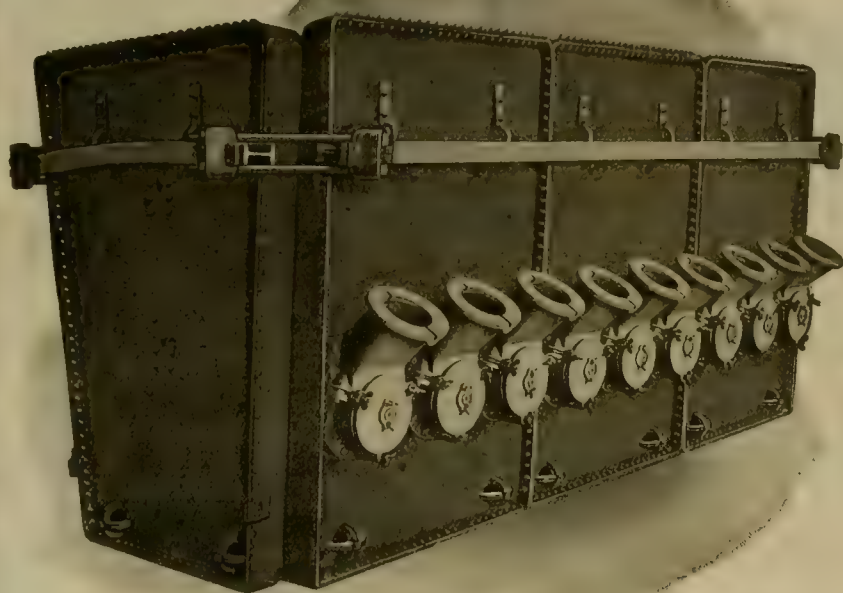
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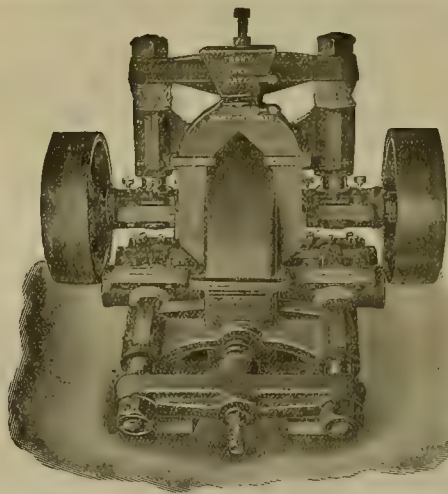


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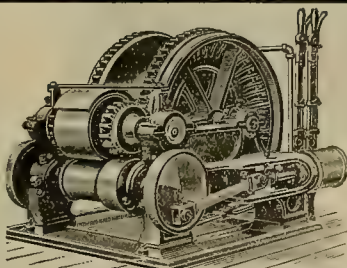


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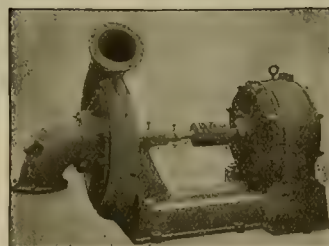
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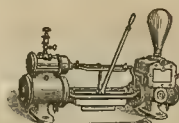
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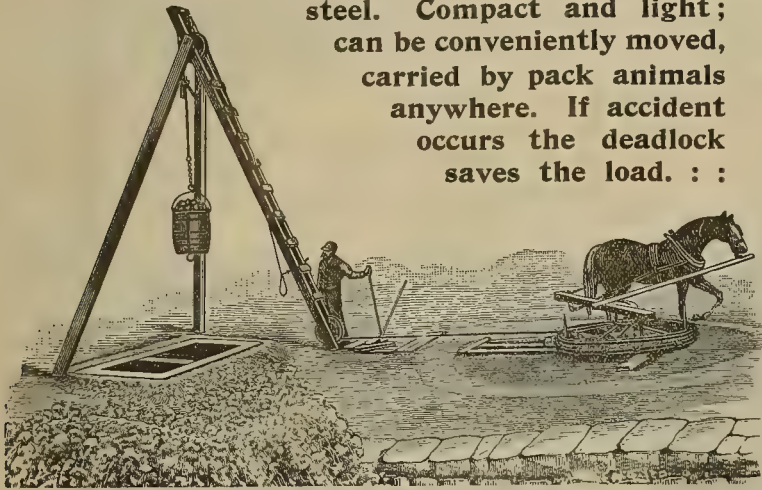
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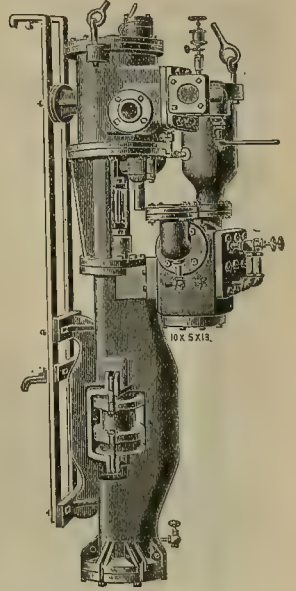
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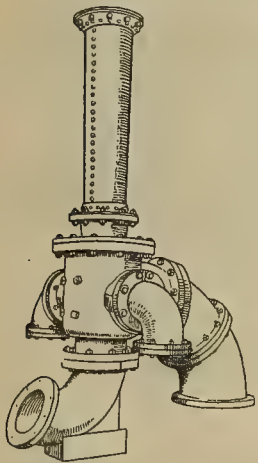
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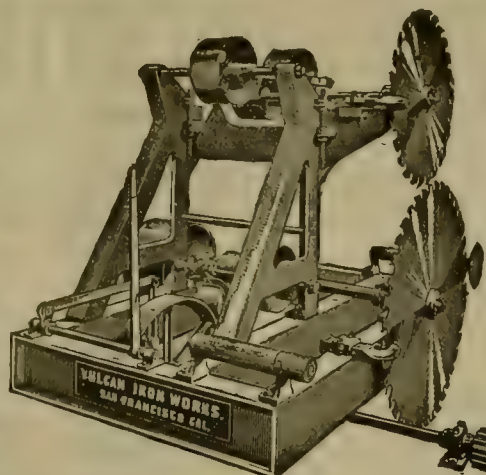
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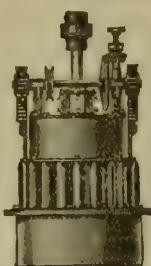
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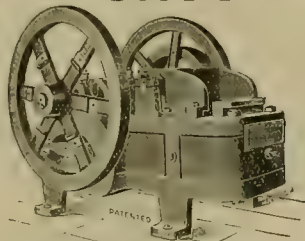


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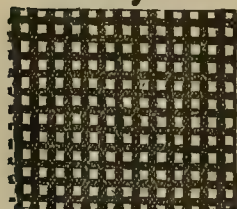
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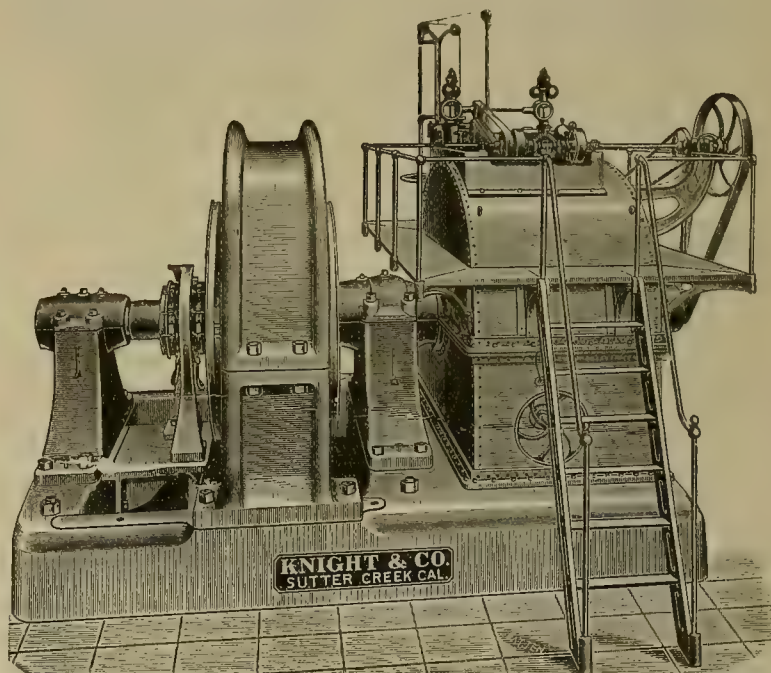
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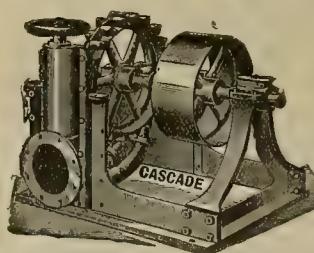
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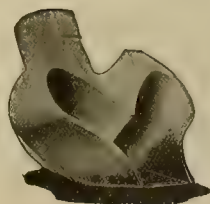
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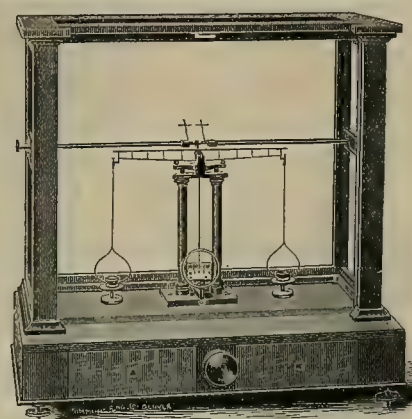
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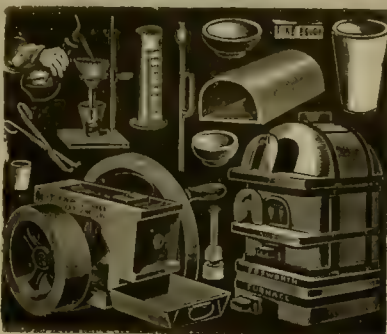
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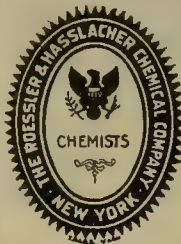


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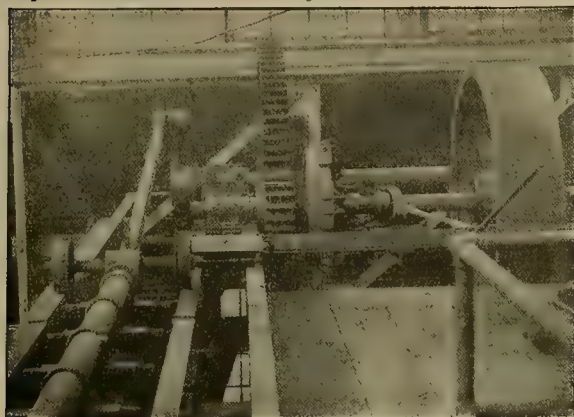
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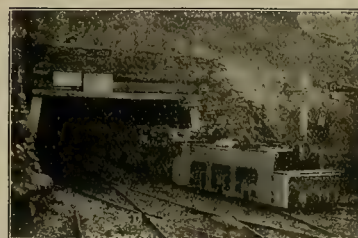
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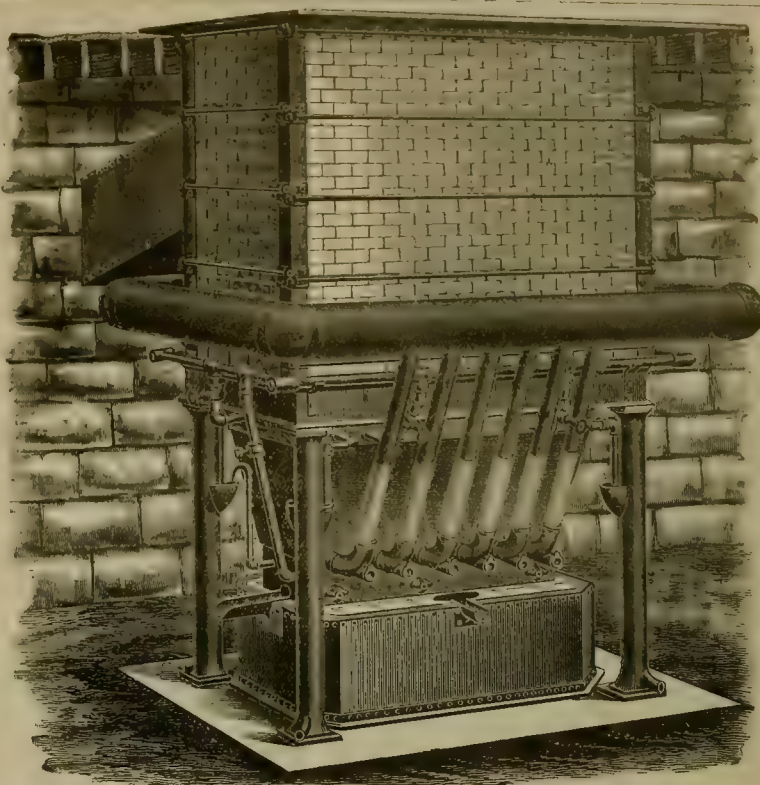
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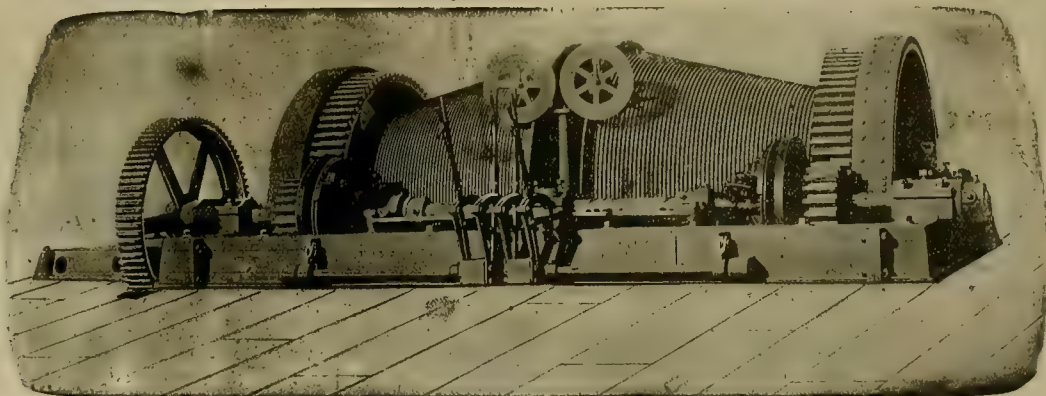
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DELINQUENT SALE NOTICE.

AMERICAN OIL AND REFINERY COMPANY.—Location of principal place of business, San Francisco, California; location of works, Contra Costa County, California.

Notice.—There are delinquent upon the following described stock, on account of assessment (No. 3) levied on the 26th day of March, 1901, the several amounts set opposite the names of the respective shareholders, as follows:

Names.	No. Cert.	Shares.	Am't.
Allen, S. L.	110	12	\$ 60
Anderson, Mrs. Lulu	270	2	10
Anthony, J. C. Trustee	797	1,000	50 00
Anthony, J. C. Trustee	798	1,000	50 00
Anthony, J. C. Trustee	799	1,000	50 00
Anthony, J. C. Trustee	800	500	25 00
Anthony, J. C. Trustee	801	500	25 00
Anthony, J. C. Trustee	802	500	25 00
Anthony, J. C. Trustee	803	500	25 00
Anthony, J. C. Trustee	804	500	25 00
Anthony, J. C. Trustee	805	500	25 00
Anthony, J. C. Trustee	806	500	25 00
Anthony, J. C. Trustee	807	1,000	50 00
Anthony, J. C. Trustee	1021	4,300	215 00
Avery, Mrs. Jennie	716	5	25
Avery, Mrs. Jennie	723	5	25
Barto, Harrison	808	2,500	125 00
Barto, Harrison	812	500	25 00
Barto, Harrison	813	500	25 00
Barto, Harrison	814	500	25 00
Benedict, Diction	83	48	05
Borkman, Mrs. Augusta	712	35	1 75
Brown, Mrs. Ida M.	162	7	35
Buckley, Morris	788	60	2 50
Carroll, Benj. S.	719	5	25
Carr, H. W.	529	20	1 00
Conn, Mrs. S. A.	693	25	1 25
Corbiere, C. C.	564	250	12 50
Corbiere, C. C.	565	5	25
Craw, L. T.	206	2	10
Crige, A. D.	503	1	05
Cumbers, Mrs. Maria L.	171	5	25
Donnelly, Mary M.	49	14	70
Dunlap, Mrs. W. B.	526	10	50
Donahue, Benj. S.	114	500	25 00
Bells, Charles P.	984	2,000	100 00
Bells, Charles P.	1127	10,000	500 00
Estey, J. C.	1045	100	5 00
Estey, J. C.	1135	20	1 00
Falls, Sarah	557	3	15
Petrow, Mrs. Maria W.	172	3	15
Flak, Andrew J.	366	2	10
Freeze, A. J.	6	40	2 00
Freeze, A. J.	7	40	2 00
Freeze, A. J.	9	20	1 00
Freeze, A. J.	273	10	50
Freeze, A. J.	279	10	50
Freeze, A. J.	280	20	1 00
Freeze, A. J.	281	20	1 00
Freeze, A. J.	282	20	1 00
Freeze, A. J.	283	20	1 00
Freeze, A. J.	284	345	17 25
Freeze, A. J.	450	20	1 00
Freeze, A. J.	659	20	1 00
Freeze, A. J.	671	9	45
Hildebrandt, Henry	256	65	3 25
Hildebrandt, Henry	257	100	5 00
Hildebrandt, Henry	258	1,000	50 00
Hoover, John D. Trustee	851	33	1 65
Hoover, John D. Trustee	1060	433	21 65
Hoover, Miss Esther	879	100	5 00
Holbrook, W. E. Trustee	897	10,000	500 00
Holbrook, W. E. Trustee	898	11,000	550 00
Holbrook, W. E. Trustee	899	4,500	225 00
Holbrook, W. E. Trustee	900	4,500	225 00
Holbrook, W. E. Trustee	958	2,000	100 00
Holbrook, W. E. Trustee	959	2,000	100 00
Holbrook, W. E. Trustee	960	2,000	100 00
Holbrook, W. E. Trustee	961	2,000	100 00
Holbrook, W. E. Trustee	962	2,000	100 00
Holbrook, W. E. Trustee	963	2,000	100 00
Holbrook, W. E. Trustee	964	1,200	60 00
Holbrook, W. E. Trustee	965	1,000	50 00
Holbrook, W. E. Trustee	966	1,000	50 00
Holbrook, W. E. Trustee	967	1,000	50 00
Holbrook, W. E. Trustee	968	1,000	50 00
Holbrook, W. E. Trustee	969	1,000	50 00
Holbrook, W. E. Trustee	970	1,000	50 00
Holbrook, W. E. Trustee	1000	1,000	50 00
Holbrook, W. E. Trustee	1001	1,000	50 00
Holbrook, W. E. Trustee	1113	2,000	100 00
Holbrook, W. E. Trustee	1119	2,000	100 00
Holbrook, W. E. Trustee	1123	2,000	100 00
Kessing, E. L.	838	15	75
Lucas, Mrs. T. E.	848	10	50
McCuen, Mrs. N.	365	2	10
McAlister, H. L.	1071	100	5 00
Murray, Peter William	70	1	05
Niederost, August	207	28	1 40
Opitz, Conrad E.	843	10	50
Peters, W. S.	15	40	75
Peters, W. S.	333	500	25 00
Peters, W. S.	672	5	25
Pipher, Jos. E.	102	2	10
Reynolds, Timothy	303	5	25
Schindler, Louis C.	808	2	10
Shead, Mrs. Dora L.	820	100	5 00
Smith, James B. Trustee	985	1,000	50 00
Smith, James B. Trustee	986	1,000	50 00
Smith, James B. Trustee	987	1,000	50 00
Smith, James B. Trustee	988	1,000	50 00
Smith, James B. Trustee	989	1,000	50 00
Smith, James B. Trustee	990	1,000	50 00
Smith, James B. Trustee	991	1,000	50 00
Smith, James B. Trustee	992	1,000	50 00
Tarpey, W. J.	875	14	70
Walser, Mrs. Lizzie	342	125	6 25
Young, Richard	746	91	4 55
Young, Richard	754	167	8 35
Young, Richard	755	100	5 00
Young, Richard	761	323	16 40

And in accordance with law, and an order from the Board of Directors, made on the 26th day of March, 1901, so many shares of each parcel of such stock as may be necessary, will be sold at public auction at the office of said corporation, in Rooms 322-323 Parrott building, San Francisco, California, on MONDAY, the 27th day of May, 1901, at the hour of 1 o'clock P. M. of said day, to pay said delinquent assessment thereon, together with costs of advertising and expenses of sale.

J. C. ANTHONY, Secretary.

Office—Rooms 322-323 Parrott building, 325 to 355 Market St., San Francisco, California.

POSTPONEMENT.

By order of the Board of Directors, the day of sale of the above delinquent stock has been postponed to MONDAY, the 24th day of June, 1901, at the hour of 1 o'clock P. M., at the office of said corporation in Rooms 322-323 Parrott building, San Francisco, California.

C. ANTHONY, Secretary.

Office—Rooms 322-323 Parrott building, 325 to 355 Market St., San Francisco, California.

POSTPONEMENT.

By order of the Board of Directors, the day of sale of the above delinquent stock has been postponed to MONDAY, the 24th day of July, 1901, at the hour of 1 o'clock P. M., at the office of said corporation in Rooms 322-323 Parrott building, San Francisco, California.

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ASSESSMENT NOTICES.

WILLIETTA MINING & MILLING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Tuolumne County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 11th day of June, 1901, an assessment (No. 1) of one (1) cent per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, Room 8, 206 Sansome street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 30th day of July, 1901, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 12th day of August, 1901, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.
FRANK E. CORDES, Secretary.
Office—Room 8, 206 Sansome street, San Francisco, California.

MARIPOSA COMMERCIAL AND MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Mariposa County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 15th day of June, 1901, an assessment (No. 2) of ten (10) Dollars per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, Room 223 Crocker Building, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 10th day of August, 1901, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 2nd day of September, 1901, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.
ALEX. GRANGER, Secretary.
Office—Room 223 Crocker Building, San Francisco, California.

TANANA MINING COMPANY.—Location of principal place of business, San Francisco, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 14th day of June, 1901, an assessment (No. 3) of ten (10) Dollars per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, Room 801 Claus Spreckels Building, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 23d day of July, 1901, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 2nd day of August, 1901, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.
EDWARD H. STEARNS, Secretary.
Office—Room 801 Claus Spreckels Building, San Francisco, California.

YUBA CONSOLIDATED GOLD MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Nevada County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 22d day of June, 1901, an assessment (No. 2) of three cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, Room 801, Claus Spreckels Building, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 30th day of July, 1901, will be delinquent and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 19th day of August, 1901, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.
EDWARD H. STEARNS, Secretary.
Office—Room 801, Claus Spreckels Building, San Francisco, California.

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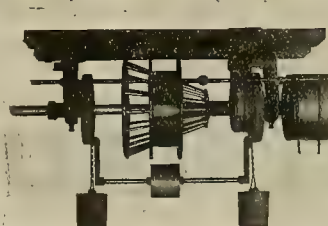
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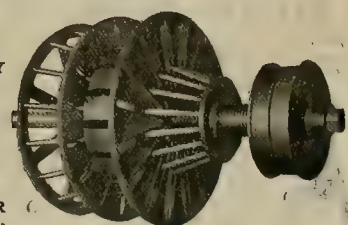
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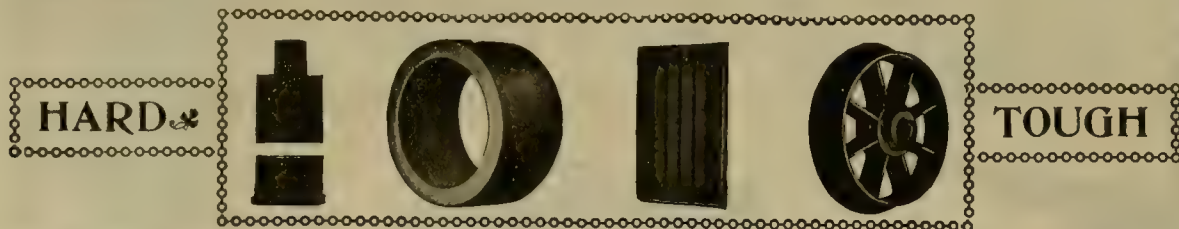
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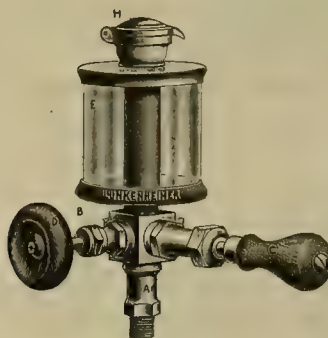
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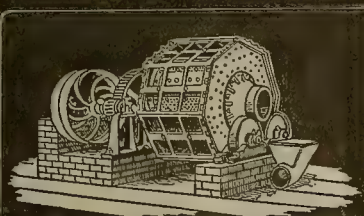
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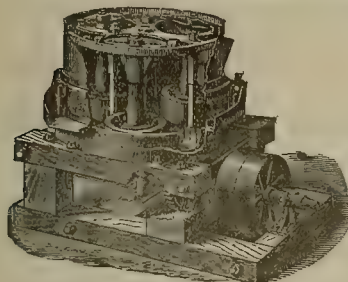
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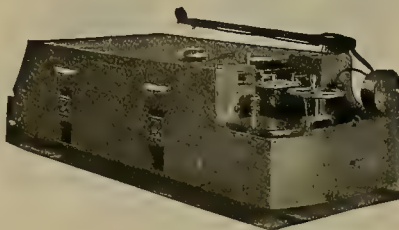
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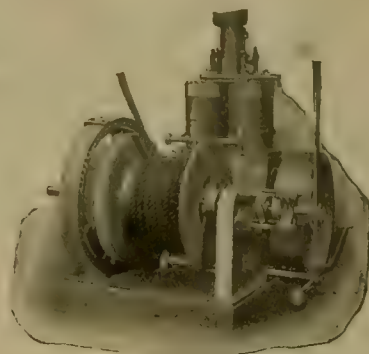


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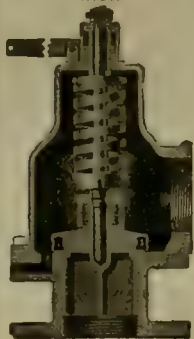


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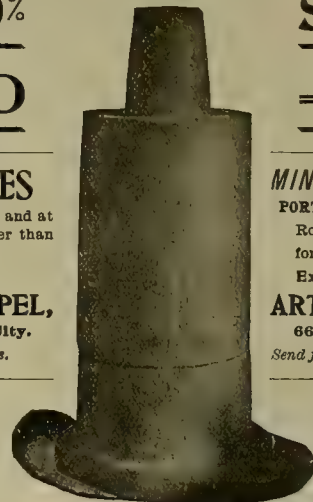
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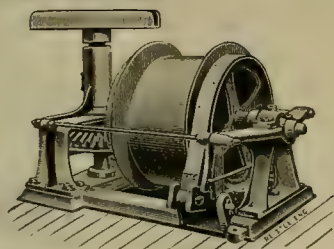
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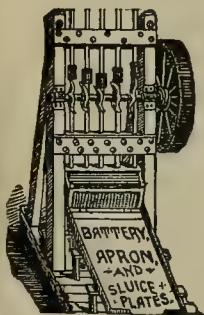
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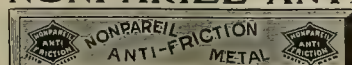
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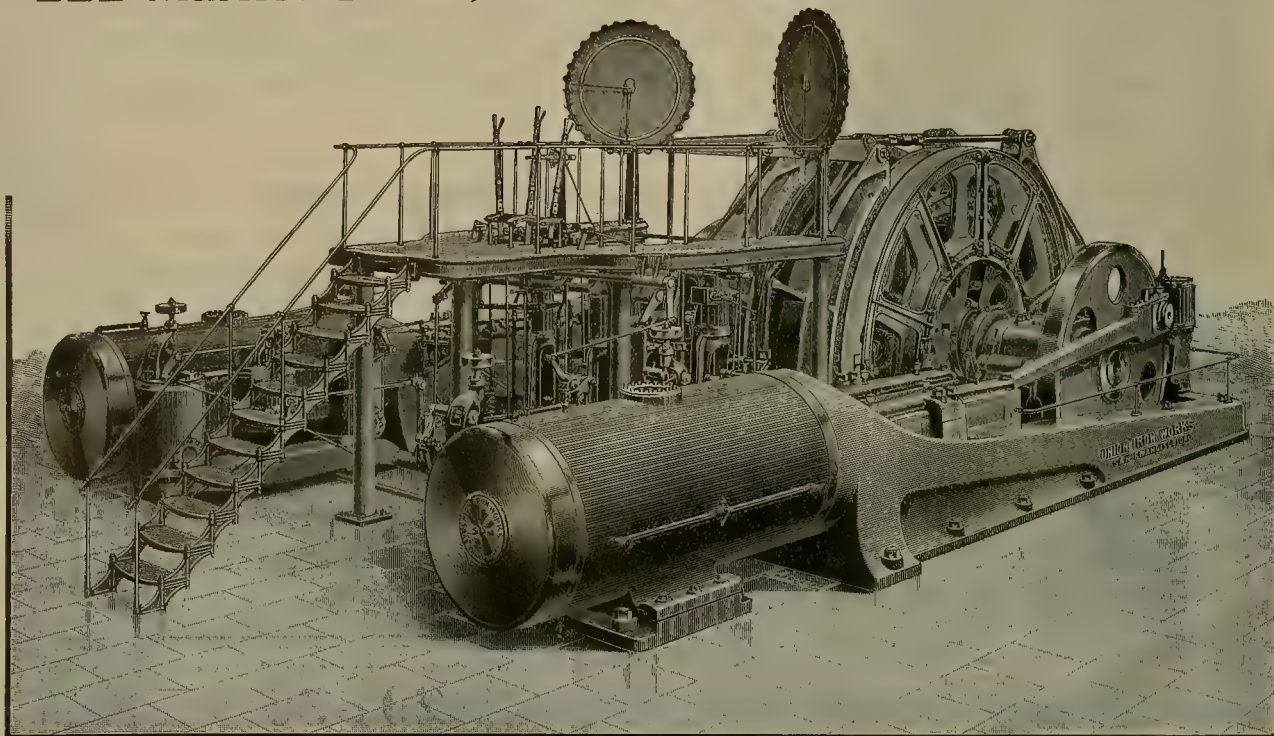
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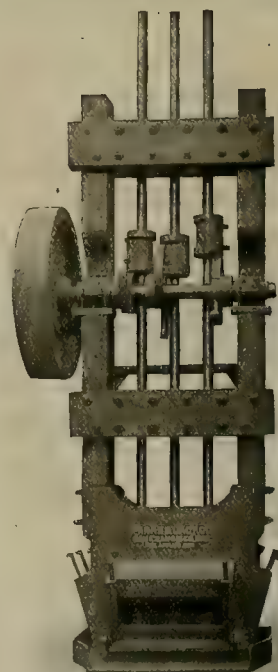
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SAN FRANCISCO, SATURDAY, JULY 13, 1901.

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Single Copies, Ten Cents.

The Evolution of a Mining District.

It is ever a source of surprise, the average individual's conception of what mining is. The idea that it is one of the most exactly organized of industries, that its business is one of the most perfect expressions of the modern commercial idea, seems to be appreciated only by comparatively few of the people most intimately concerned in carrying it on. By the great majority it seems as if it would always be considered a great game of chance. In considering it, the business of mining is always subordinated to the chances of mining. Promises and hopes seem to rate higher with the mass of people than existing performance. The successes in the business of mining are the attractions which induce investment, not to imitation of them, but to chance. A mine that has been developed and its earning power determined becomes an investment proposition for income, and measurably has its value fixed by the amount of anticipated profits. There is no speculation in it. There is no chance by which a development of metal value will make the mine so much more desirable to another person that the speculative investor will be enabled to take profits at once out of that person's pocket, instead of waiting for the mine to produce it.

Naturally, mining to people who instinctively regard it as a form of legitimate gambling, is largely a game of follow the crowds. A mine in a new district is made a commercial success by the application to its development of business principles, judgment, technical skill, thrift and honesty. The extensions and the district become at once the scene of mining gambling activities. The mine future, built and paid for as described by the mine making the initial success, is discounted and sold for other mines while they are



Open Cut in the Leaking Vein, Kendall Mines, Fergus County, Montana.—(See Page 15.)



Leaching Tanks in Kendall Cyanide Mill, Fergus County, Montana.—(See Page 15.)

in the prospect stage from which they may never emerge. The crowd who follow, in reality buy what it was their hope to sell. In time—more or less, it may be years, or a lesser number of months—the buyers of the future know that they cannot realize it. That it was a game that they played at and lost, and not a business that failed, is rarely realized. Usually it is the mine and mining that is blamed, when in reality there was neither mine nor mining. A mining district is set back in genuine development and its real value ceases to be recognized with the wiping out of the speculative interest.

All mining districts have at one or other time passed through this stage of evolution. It seems as if waste and mistakes in mining are inevitable accompaniments of mining progress. True causes are rarely generally realized. It is easier to ascribe the effects to symptoms. Unwise legislation, high taxes, extravagant and incompetent management, swindling in sales of mines, inefficient labor, and labor and capital conflicts, are all charged as the fault from which has come a failure of mining in a district which at the beginning seemed inevitably destined to be a success of mining. These things may be all true, but they are not the causes of failure. They are the failure itself—the unclean things that breed in corruption. The cause was deeper—it was in the considering of the mines and mining as mere counters in a gamble, in the desire to get something for nothing or a very little, in the mental constitution which would not regard mining as a commercial business.

After all, though, the district still has the real mines. The business sense, honesty and commercial instinct which leads to success still exists and ever seeks its own. The reaction after a speculative fever is not death—it is a step in advance towards fortune.

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STATE MINERALOGIST AUBURY of California has properly called attention to the unauthorized and improper use made by mining stock promoters of the title of his office. Neither he nor his assistants as such report on mines for private use. The assistants are all mining engineers of high professional attainments and personal repute. Their connection with the public office is a distinct public benefit, promoting mining as an industry. Their connection with the California State Mining Bureau, though, is usually incidental to the regular practice of their profession, and at the most takes but a few months of the year from their private practice. The use of their names to give a semi-official character to their private professional service is wholly unwarranted.

The dredging companies and owners of dredging lands in the vicinity of Oroville, Butte county, Cal., are objecting to the assessment made of their properties for taxation. The special objection is to the assessment valuation of the land, 2143 acres of which have been assessed at \$365,255, a sum very largely in excess of its cost. It is stated that the assessment of the entire tract was only \$15,000 before dredging was begun. It does not appear that lands other than those under actual exploitation are so taxed. There seems an equity that should be recognized. It would seem that in assessing for taxation such lands there should be taken into account the condition of the land and the means provided for working it. Land that has been worked out certainly has no value—as mining ground that should be taxable. If land that is being worked the year for which the assessment is made is worth \$175 an acre, which seems to be the average of value placed on all the land by the assessor, land that with the means provided cannot be worked till next year is worth less and should be assessed less. Land that cannot be worked for ten or twenty years or more to come should be graded in value on that basis. If it is to be held that the land is all alike in value, without reference to the time of its exploitation, then, equitably, every acre of possible land that can be supposed of profitable dredging value, even though it has no dredging machinery on it, must be assessed at the same figure or on the same basis. There is nothing in the suggestion of assessment valuation graded with reference to the period of probable working inconsistent with uniform values on agricultural lands. The production of the former is a deduction from capital which does not produce earning. The production of the latter is an earning which does not deduct anything from the capital.

The La Sal Basin, Utah, Smelting Organization.

Some of the mine owners of the La Sal Basin, San Juan county, Utah, are said to be organizing to build a smelter to reduce the ores of their mines. The report states that stock will be subscribed by the mine owners, and that bonds will be issued at par with a stock bonus. The smelter is to be built close to the mines, and to be connected with them by a rail line owned and operated as part of the smelter plant.

The enterprise is squarely in line with the business policy this paper has advocated for mine owners. Custom mills and smelters have their economic place in providing a means for the making of a mine from the raw material with the least risk to already created capital. The mine once made, the operation of it for profit is a commercial mining business, in the economy of which reduction of ore to a consumable metal is one of the details, and it should be accomplished at cost, in order to give to the mine the largest possible margin of profit over ore extraction costs. This involves, as a necessity, the ownership of the reduction plant by the ownership of the mine. The La Sal miners are, in a businesslike manner, combining their mines to support a single reduction plant, availing themselves of the direct economies of industrial centralization, and the indirect economy of limitation of the element of risk by making a minimum the capital investment in reduction plant for each separate mining operation. They are also providing for the unavoidable transportation of waste with the same economy of capital investment and operative cost.

A suggestion as to the manner and conditions of the proposed capital investment of the La Sal project is perhaps pertinent. The statement is to the effect that the stock is to be subscribed by the mine owners; that bonds are to be issued; that, as an inducement to buy the bonds, a bonus of stock is to be given. The latter is an element of possible ultimate weakness. It implies dividends on the stock, else the bonus has no value at all. Dividends give to the stock a premium, which makes its ownership more or less desirable, independent of the ownership of the mines, and the business then differs not in kind but only in degree and name from the custom smelter organization. Bonds are merely the evidence of borrowed capital, for which the plant is the real security. No bonus of stock should be given as a premium to the lender. If the debt has to be discounted, charge the discount to capital. The stock and capital paid in on it should, as near as possible, represent the respective ratios of ore tonnage anticipated to be supplied. It should not receive dividends; but the surplus earnings, after providing for the replacement of the borrowed capital, should be applied in part, and first, to what may be termed an insurance fund, to repay to stock subscribers their capital investment when their mines becoming worked out, cease to provide ore and their business interest in the smelter terminates: in part, and second, to a distribution pro rata for the tonnage severally supplied for any convenient time interval. In effect there would be the equivalent of dividends on stock, but it would be based on ore tonnage. It is assumed that the smelter costs charged against the ore would be, for business convenience and simplicity, something in excess of flat costs, so there would be a surplus for distribution.

The business effect of doing away with dividends on stock as such and distributing surplus, as suggested, would be the creation of a condition tending to keep the ore tonnage supply at its economic maximum, and thus the costs of reduction at their economic minimum. The insurance fund to replace the stock capital is the only possible tax, and only becomes a tax in the event of an unforeseeable mine failure before it has provided its estimated tonnage to the smelter. The stock, considered as suggested, becomes in fact the evidence of a loan of capital that does not bear interest.

The essence of the business organization of such enterprises as the projected La Salle Basin Smelter is to make the mine more surely profit-earning by eliminating the waste of the profit margin in paying a mere machine an earning for service. The smelter, jointly owned and operated, must be considered as to

profit earning exactly as if it was the appurtenance of a single mining operation. The capital in it should not be permitted to make earnings and pay dividends; but it should be regarded and treated as a machine of the mine, precisely and for example, as if it was capital invested in a hoisting engine. Smelting enterprises, conducted in the manner suggested solely as an appurtenant detail of the mines, cannot be absorbed into combinations that will in the end absorb the mines. On the contrary, they will give to the mines all the industrial advantages that such organizations have, without the surrender of individual control of the mines and the possible profits of mining.

THE announcement is made that township and sectional surveys are to be begun this summer in Alaska a hundred miles inland from Valdes. The reason of the particular selection of locality is not stated. Probably it has reference to the line of railroad projected from Valdes to Circle City on the Yukon, and to possible agricultural development when opened up. A district in which public land surveys would become more immediately an aid to development would be Prince of Wales Island. It is an extremely rich, undeveloped, mineral-bearing area, and rich in timber and fisheries. Among minerals, besides gold, silver, copper and lead, there are iron and coal, the latter of unproven quality as yet. The timber includes varieties adapted to paper pulp manufacture and other varieties suitable for furniture and cabinet work. The climate is mild, permitting effective work the year around. There are numerous opportunities for the cheap development of large water powers. There are many excellent harbors. The island is on the main inside route of all Alaska steamship travel. The natural resources and natural facilities exist for a great economic development, which a public land survey would both directly and indirectly assist—directly by making it possible to get the fee title to lands necessary for the exploitation, and indirectly by making officially known in detail the magnitude and availability of the natural wealth.

THE Pacific coast and mountain States should be the source of the metals and their manufactures exported to China, Siberia and eastern Asia generally. The advantage of distance and time of transportation is two to one in their favor. But two disadvantages have to be overcome, one industrial and the other commercial. The Pacific coast country does not yet produce iron or steel at all and manufactures very little of any metal into consumable export forms. Commercially, steamer freight rates from New York via the Suez canal to eastern Asiatic ports, two-thirds of the way around the world, are no more than freights across the Pacific only one-half the distance. The reason for this is that there are no return freights of consequence across the Pacific, so that the export traffic is compelled to pay the steamship earnings for the round trip. There is not sufficient population on the Pacific coast to consume any great quantity of return Asiatic production. The commercial disadvantage is, however, hardly as important as the industrial. Before the Pacific coast can become the source of metal exports to eastern Asia it must produce and manufacture iron and steel. For this both the raw materials and facilities exist. Only the disposition requires to be cultivated.

ALPINE COUNTY, CALIFORNIA, received a setback in mining development twenty-five years ago through the failure to realize extravagant expectations from some silver mines. The development was incidental to operations on the Comstock in the bonanza days, but could not stand the same methods of exploitation. Recent reports indicate that development is being resumed with gratifying success. Gold bearing quartz ledges, the existence of which might have been long since inferred from placers which could have had no other source, are being discovered. Some of the old abandoned mine openings are being successfully worked for gold where they failed operated for silver a quarter of a century ago. Of necessity what is so far done is very small—it is only a beginning—but it is suggestive of possible successful re-exploitation of long closed down mines, and the revival to old time population and activity of towns that have been mere survivals of names.

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A CYANIDE SOLUTION containing zinc cannot be successfully titrated by the iodide of potassium method.

THE total production of copper for 1900 was 486,084 tons, as compared with 472,244 tons in 1899. The United States produced 55% of the total.

THE use of a long wall machine cutting coal in a coal mine is reported to have resulted in 500 tons being undercut in one day at a cost of 2 cents a ton.

IN underground haulage in coal mines wire rope transmission is cheaper up to a radius of 1 mile, but with greater distances electricity becomes the cheaper.

THE decision of the Commissioner of the General Land Office of the U. S. is that mining locations without regard to mineral discovery constitute an occupation of the land.

THE costs of making iron at Sydney, Nova Scotia, are estimated: For 1.8 tons iron ore, \$1.80; 1.25 tons coke, \$1.80; .75 ton limestone, 40 cents; labor and incidentals, \$1.50. Total, \$5.50 a ton.

THE performance of all the acts required to make a valid location does not make a valid location when the law does not permit the location to be made. The right to make the location is the prerequisite condition to a valid mining location.

CERTAIN of the lately discovered rare elements, which are spontaneously luminous and produce and radiate electricity, are actually producing energy with no apparent source with which they could receive it, and appear to contain within themselves indefinite supplies of power.

THE wedges in timbering up to a working face should be driven toward the face, not from it. The impact of flying rock from blasting tightens the timbers in place if the wedges are driven toward it, but is likely to displace the timbers if the wedges are driven from the blasting direction.

REGARDING the use of water becoming a right of use appurtenant to land the Supreme Court of Oregon has decided that where the owner of a placer mine used water from a ditch owned by another party to work the mine, such use made the right to appropriate the water appurtenant to the land, and the right passed with the deed to the land.

THE arrastra is a fine grinder and amalgamator, but it cannot be hurried. It is not suitable for low-grade ores except that set tandem to a stamp mill to grind the tailings and it will save values that pass the stamp mill. With \$1 a ton in recoverable gold and free water power a battery of arrastras so employed will make a profit where cyaniding would not.

THE increase of temperature with the depth of the mine opening is not the same in different mines. The range of variation is considerable. As little gain as 1° Fahr. to 130 feet depth and as large a gain as 1° Fahr. to 34 feet have been recorded. Generally in estimating in advance of exact knowledge of the fact it is taken as being 1° Fahr. for every 60 feet.

PANNING is a fair means of finding out what is the concentratable matter in an ore, but the ease or reverse of ease with which the panning is effected is not a safe guide on which to determine the commercial concentratability of the ore. The personal equation, among other details, is too large an element in panning for its results to be considered conclusive.

TIN SCRAP is practically all made at the Pacific coast salmon canning plants during the few weeks immediately preceding the salmon canning season. Hundreds of tons of tin plate are turned into cans during this period. All of the plants are on water transportation routes. The scrap could be very cheaply saved and shipped to some central point, where a treatment plant could recover the tin and put the iron scrap into shape for economical utilization.

THE cost of mining hematite iron ore and loading it on ship board at Bell Island, Newfoundland, determined from three years operation, is 45 cents a ton. The cost of steamer transportation to Sydney, Nova Scotia, where the blast furnaces are located, is 45 cents a ton. The total cost of the ore, which contains 55% of iron, delivered at the furnace mouth, does not exceed \$1.25 a ton. The best result obtained with ores from Lake Superior is \$2.50 a ton.

THE customary practice in timbering mining shafts is to place the sets 5 feet apart between centers. In a vertical shaft the inside frame lines of the side and end plates should be exactly in line and plumb. Hangers, rods of $\frac{1}{2}$ inch or 1 inch diameter, with a hook at one end and threaded at the other, are used in couples on the side plates to draw the sets being put in, into place with the others. Wedges are employed in making the final tightening and exact adjustment.

A TRUE MERIDIAN can be obtained using a transit. The method is that of equal altitudes of the same star on each side of the meridian. The instrument is set up and the altitude is taken of a star several hours before it crosses the meridian. An equal altitude observation is taken of the same star after it has passed to the west of the meridian. During the time interval the star has passed over a horizontal angle shown by the reading on the transit plates. Make the verniers on the instrument correspond with the middle point of the reading, divid-

ing the angle in exact half, and the telescope will indicate the direction of the meridian, which can then be marked on the ground.

IN grading a water ditch it is not necessary to increase the grade on going around bends. A slight widening accomplishes the same purpose. The maximum grade that can be safely given depends on the quantity of water and the material in which the excavation is made. Some mining ditches in California that carry as much as 60 cubic feet per second are constructed in a red clay soil with grades up to 26 feet to the mile. Generally the grade should be such as to give a mean velocity of 3 or 4 feet per second.

A RECENT California decision relating to assessment work on a group of claims where the work was performed on one is that the question whether or not the work was of benefit to any or all of the claims could not be questioned, as a court could not be permitted to substitute its judgement as to the expediency of the methods employed for the development of a mine for that of the owner of the mine. The Interior Department has made rulings in hearings before it that are opposite to this decision.

MEXICAN labor cannot always be considered cheap. It is a mistake to figure that because men can be hired there for certain classes of work for 30 cents a day, the product of their labor will be correspondingly cheap. Cheapness is not regulated by what you pay, but by what you get for what you pay. The Mexican laborer is usually slow and as thoughtless of his employer's interests as he is improvident with regard to his own welfare. An American miner at \$3 per day is "cheaper" than a peon at 30 cents.

THE actual loss of copper in the processes of smelting and refining with good practice should not exceed five or six pounds to the ton of ore, about three-tenths of 1%. The smelter deduction of 1.3% is a custom which started in England and has been transplanted with the copper smelting industry. The smelters explain the practice now by the statement that the deduction is an indirect payment of smelting charges. That is to say, the charge for smelting would have to be made higher if the deduction was not made.

THREE eight-hour shifts cannot be employed economically in mine work. As a matter of fact, under the most favorable conditions as to clearance of powder smoke the working time of the shifts after taking out half an hour for lunch is not over seven hours. It is a question if miners do as much work in an eight-hour shift as in a nine-hour shift, it being argued that the work done in two nine-hour shifts is practically 90% of that done in three eight-hour shifts, so that the extra 10% is made at an addition to the labor cost of 50%.

THE usual diameter of steel employed for single hand drilling is $\frac{3}{4}$ inch. A more economical diameter is $\frac{1}{2}$ inch. Practically as much depth of hole can be drilled with the larger diameter as with the lesser. The economy of the larger steel is in the blacksmith work and in the gain of work done by the powder. The larger hole permits of the powder being placed nearer the bottom. It is found in practice that the larger diameter drills do not go to the blacksmith shop as frequently as the smaller ones when drilling in the same rock.

PAY STREAK in a placer mine refers to and is the name of the portion of the gold-bearing ground that will pay at least the flat costs of mining it, but not including the cost of dead work. The quantity of gold in the ground required to make a pay streak varies with the costs of mining. While not capable of technical expression by the same numerical equivalent in all mines, the term is in the commercial sense exact. Placer ground that, to mining on a commercial scale, does not yield sufficient gold to pay the commercial mining costs, is not a pay streak.

IN opening a blanket or lightly dipping deposit by a shaft where there is considerable water to be handled, the preferable point of location for the shaft is about the center of the ground it is proposed to work. The water in the portion of the ground which is below gravity drainage to the sump at the foot of the shaft is pumped to the sump, and the mine spoil from this area is hauled up to the foot of the shaft by cable traction or other convenient means. Measured against the total output of the ground there is a saving effected over the cost if the shaft be sunk to the deepest point of the deposit and water and spoil be all lifted direct to the surface.

A STRAIGHT-EDGE and "T" square can be employed to transfer with a high degree of accuracy a surface line into underground working through a vertical shaft in which the structure only permits a very short base line between the two suspended plumb lines, or where the conditions preclude the setting up of a surveying instrument over either of the points. The straight edge is fixed in the line of the plumbs so that the "T" square can be used with it to fix a new line at right angles, in a convenient position for the employment of the transit. The distances are, of course, measured and recorded exactly as if the transit was used in place of the simpler tools.

THE Supreme Court of Montana has decided that all mining claims patented, or merely locations, are taxable. With regard to the last the practice in different States has not been uniform, some States taxing, some imposing no tax, and some taxing the improvements. The practical difficulty involved in taxing them comes from the abandonment of the claims between the date of as-

essment and the date the tax is payable. The tax becomes delinquent and the location is sold after it has really ceased to exist. It may be relocated in the meantime and the result is a clouded title. The most satisfactory system of taxation of mining claims seems to be that applied in some of the California counties. The assessor assesses them as personal property and collects the tax at the time of assessment.

THERE are several methods of recording angular measurements in transit surveying. The method of deflection angles obtained by reversing the telescope of the transit from the back sight with the verniers clamped at the zero points, and then reading the angle turned to the right or left to make the new course, is a method practiced successfully and is simple in the field. In checking up the field books and platting it involves more labor and more chances of small error than the following described method: This consists in reading the angles in the field from the meridian or from a fixed base line. The verniers are then clamped for each back sight on the true reading of that line from the meridian or base and the reading is made from the zero points, which are thus each time put in the meridian or base line. There is a check in the field on error by the double reading given, and the checking of field books and platting are much simplified.

THE Stockton, Cal., U. S. Land Office recently made a decision on a contest for a quartz patent on land already patented as a placer mine, deciding against the quartz claimant on the fact that the quartz lode claimed was not known to exist at the time the placer patent was granted. The patent to the land in dispute was decided as vested absolutely by the placer patent in 1874. The quartz claimant did not initiate a contest until 1898. The first issue raised in the case, the right of a hearing to determine the fact, was decided on appeal, both by the Commissioner and Secretary of the Interior, favorable to the quartz claimant. Placer patents are, therefore, clearly regarded as subject to review and voidable if they improperly include lode deposits of minable value known at the date of application for the patent, regardless of the interval of time that may have elapsed since the issuance of the patent. It would seem that lodes known to be valuable at the time of application for patent are subject to location at any time, and controlled as to ownership and use by the mining statutes just exactly as if they were still on unpatented public land.

IN the practice of copper metallurgy in Germany wet methods of extraction are only employed where the ore is too low grade for dry process working. U. S. Consul General F. H. Mason, at Berlin, Germany, states that any owner of low-grade copper mines in the United States who wishes the opinion of German experts as to the best method of working them, and the approximate cost of necessary plant, can do so without expense by sending to the U. S. Consulate at Berlin ten-pound samples of the various ores produced by the same mine, together with full and precise information on the following points: Are the ores sulphides, oxides, or carbonates? What accessory minerals, as quartz, limestone, sand, etc., are at hand? What is the average run-of-mine percentage of copper, so far as known? What is the cost of labor per day? What is the cost per ton of coke or bituminous coal? How much ore should the proposed plant work per day? Is there an abundant water supply? What is the cost per ton of scrap iron? What is the cost per ton of sulphuric and muriatic acids? Mr. Mason says that with this information, and samples of all the grades and varieties of ores which can be combined for treatment, an experienced German mining engineer will make analyses and report which method, dry or wet, will be most effective, will submit estimates of the cost of a plant, and, if desired, will go to America to superintend its installation and initial workings.

IN shaft sinking, where the timbering is kept close up to the bottom, an excellent protection against the breaking or injuring of the timbers by flying rock from the blasting can be made of green pine or spruce poles. Each of the side plates is bored vertically with two holes near the ends, but inside the end plates, and where they will not interfere with the holes bored for the hangers. Two false side plates are made by splitting in half a green pine or spruce pole of a couple inches greater diameter than the thickness of the framed timbers. These plates are bored to correspond with the holes above described. Through the corresponding holes bolts are passed with the nuts and washers on top of the framed plates. These bolts act as suspenders and draw the false plates up till there is a space between of 7 or 8 inches. A floor of green pine poles 6 or 7 inches in diameter is then placed transversely with the shaft, the ends being held in the space left between the fixed side plates and the false plates, but not otherwise fastened. These short poles may floor the entire area during firing or may leave the hoist compartment clear, as the firing is done by battery or by fuse. While the men are working in the bottom of the shaft these short poles are stored on top of sets of timbers, out of the way. When a new set of timbers is put in the false side plates are released by removing the suspending bolts and lowered on the floor of the shaft till the new set is in place. The green timbers here suggested are not only much cheaper than the split or sawn lagging generally employed, but are a more complete protection and last longer than the dry lagging and sawn lumber spiked to the fixed sets. The green sticks are much less brash than the dry and resist impact better.

Genesis of Ore Deposits.

PART II.

Written for the MINING AND SCIENTIFIC PRESS by
MATT W. ALDERSON.

HOW TO FOLLOW PAY IN A MINE.—Let us forget, for the time being, all the theories of vein formation with which we have been made familiar. Let us walk along the banks of some stream. Let us note its peculiarities, so that if we find them somewhere else we will recognize them. We commence at the little rivulet, coming down from some precipitous hillside. We notice that it is a natural ground sluice—in other words, that the ground breaks down as one passes up the stream and the wash is carried below to fill up some lower place and make the bed of the stream more level. If the bed of the rivulet, therefore, be of mud or clay, we notice that the stream has gone down hill in little steps. We notice that the same is true of larger streams, only the signs are not so marked, because in them the water flows with less rapidity. The level places are of greater extent and the steps down are seldom observed except where there are rapids.

Let us notice the sides of the stream on a rocky bank. See the lines of fluting on the rocks, where they have been scored and striated by ice in the spring time. We notice the lines on the rock are always in the direction of the stream that made them, so that if we found similar effects on a rocky hillside, where there was no stream flowing below, we would instantly divine their cause. Let us walk out over a sand bar of the stream. Part of the surface of the bar is smooth, but in places we note evidences of the fact that water has formed over it V-shaped or corrugated troughs or depressions, some deep and some shallow—mostly the latter—and we note that these depressions extend lengthwise in the direction the water took in crossing the bar. Suppose we were unexpectedly set down on a large sand bar, where the river which made the bar could not be seen. We could tell the direction the stream had taken when forming the bar by noticing these depressions and the little steps down made here and there by the flowing water.

The mountain torrent moves rapidly, carrying oftentimes boulders of appreciable size, ground sluicing out the old bed and making a new one quite frequently. It takes the straightest possible course to the valley below. But in time the stream cuts its way into solid rock, which makes permanent rapids, and below these rapids there will be small flats, made by sediment washed down from higher levels. Few streams flow in a straight line. The small stream frequently makes very abrupt curves, regular zigzag lines, back and forth across a valley. The larger stream flows more quietly, in some places without a ripple on its surface. Generally the water has depth at such a place. In other places the stream flows more rapidly, the water passing over a riffle or down a cascade.

Now, we go into a mine, bearing in mind that quartz veins were made by just such streams as we have been looking at. Our first observation is to note the apparent course of the stream which made the deposit. Generally speaking, by noting the general course and direction of the pay shoot, itself, one may form a reasonably fair idea of the direction; for most pay shoots will be found to have their greatest lengths in the direction of the stream by which they were deposited. But we have a safer rule to follow than that. We have the corrugated surface—the lines of fluting and striation on the walls and in the clay gouge. These we may follow with absolute certainty, bearing in mind that no stream takes a straight course and that no two pay shoots are at all likely to be in direct line with a third. Where the pay shoots are large, we may expect the vein to pinch on the ends in the same manner as a flowing stream becomes shallow below a deep place, as it flows over a riffle, and after we have passed through the pinch we find another pay shoot—not, perhaps, in line with the first, but more likely on the other side of the channel, as we frequently find the deep holes in a river.

All mineral deposits were formed by streams flowing on the surface of the earth at the time the deposits were made. The secret of keeping in good ore and of following pay in a mine, therefore, comes from using judgment in reading the laws governing the deposit. These laws are as fixed and immutable as any of the other laws of Nature, and as susceptible of intelligent interpretation.

Fig. 1 is a representation of the ore shoot in the Fargo mine, Helena, Mont. It represents the ore body as if we were looking down upon it, the hanging wall being removed. This ore body is in limestone and is of the class denominated "pipe vein." It was, so far as we are able to judge, made by a stream which one could easily jump across—only a few feet in width. From A to B the ore body was 3 to 4 feet in width by 18 inches to 2 feet in thickness. From B to C the vein was wider and thicker, and from this place ore was shipped, one car going \$24 per ton and

another \$32. The ore mined was first reached at A by an upraise from G in a crosscut tunnel. The pipe was followed to B on a curve which turned back on itself completely for about 10 feet. Following upwards on an incline of about 30°, the pipe apparently pinched out and came to an end at C. There was a strong showing of ore on the surface at F, some 60 feet above C. But where was the connection and

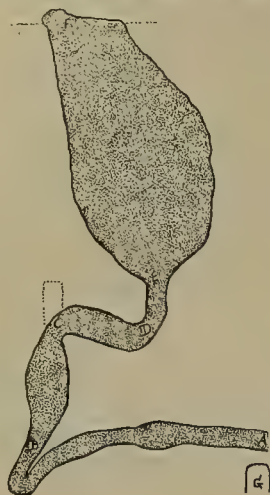


FIG. 1.

how was one to find the lower end of the ore shoot which apexed at F? The formation above C was "drummy" and easily mined. The lay of the ore was such as to assure one that the original ore-forming stream had flowed more rapidly from B to C than it could from C to F. Theoretically, therefore, one should look for a larger body of ore in such a place, and—behold, there was none. On the theory that water couldn't flow up hill—couldn't rise above its source—the ore body couldn't be in the hanging wall, and the only probable place was in the foot wall. The upraise was continued, therefore, some 10 feet, bearing gradually out into the foot wall. No evidence of an ore body was found. The writer, in the knowledge of the correctness of the theory of vein formation of which this article is a partial elucidation, concluded some law governing the flowing of streams had been overlooked. He walked along the banks of a stream of the present day, seeking a situation analogous to the one in the mine. He was not long in finding it. Where the stream on the surface came down over rapids and reached a flat, it didn't go in a direct line to the lower end of the flat, but turned off at a right angle to one side, spreading out thin as it did so, and then, after flowing in this direction to the edge of the valley, turned down stream again and crossed the flat. Returning to the mine, it was noticed that there was a thin showing of ore to the right at C. It was about 1 inch in thickness, in a few places a little thicker. It had been given no attention because frequently there were little thin layers of quartz on either side of the pipe, which experience had proven amounted to nothing. But this layer of ore was taken up and followed, with the assurance that it would lead to an ore body. It was followed 18 feet to the right and at D opened out into a large pipe, which at E developed into a chamber of 20 feet in width and over 4 feet in thickness.

The most prominent and productive gold mines in Montana are at Marysville, the Drum Lummon, the Belmont, the Bald Butte, the Penobscot, the Empire, etc. The formation in this section is granite and slate. The presence of slate in conjunction with the ore bodies is a good sign, for, following the well-



FIG. 2.

known law of the sorting power of water and recognizing that slate is composed of the finer particles of sediment carried by a current, we know that the slate is a long distance from the original source, and

that the water which deposited it was comparatively still, a condition favorable to perfect precipitation, not only of the muddy sediments brought down by stream action, but to the precious metal contents of the fluid as well. Further, the ores are not base, the heavier sulphides having been, in all probability, precipitated long before the stream reached this level.

Fig. 2 is a cross-section representation of the upper levels of the Belmont mine. K is what is known as the main vein, L is known as the middle vein and M as the mud vein. N is a small ore shoot near the apex of the mountain. The veins are opened by an adit tunnel. M represents a point on the mud vein distant 60 feet from K. When pay was discovered in the mud vein fears were entertained, because of the pitch, that the apex would prove to be on adjoining property, but as the upraise was made it gradually curved over till it formed a cap to the middle and main veins and all were found to apex at O. This vein is classed by the owners as a complex fissure. In the light of this article, the stream which formed the ore bodies at Marysville was one of the large rivers of this section of the country when these deposits were made. The uplifting of the country tilted some of the veins—the Belmont and the Empire, for instance—on their sides, the Belmont having been tilted over so far that what was the top of the stream, and would ordinarily be the hanging wall, is in the greater part of the mine thus far developed the present foot wall. Other mines, again, such as the Penobscot, were set on end. It is more than probable that the Belmont and the Drum Lummon were originally lakelets. In any event, they were very deep, wide places in the channel. Turn Fig. 2 on its side. The mud vein was the original bottom of the stream. After ore formed on this bottom for some time an extra flood season brought down an unusual amount of sediment, filling the channel to the level at L, where more ore was formed. This was repeated and a new vein laid down at K. In the first part of this article I enunciated the law that the best ore will be more frequently found on what was the original hanging wall side of the vein, basing that conclusion on observations of veins themselves and of streams of the present time. The reason for such conclusion is well founded, in that the stream is apt to flow for the longest period in an undisturbed condition at the highest level it makes for itself, and that condition of calm, regular flow for length of time will favor the greater deposit of ore. This mine is an exemplification of this law, the ore bodies on the main vein being larger and richer than those in the other two.

(TO BE CONTINUED.)

At a recent meeting of the Paris Society of Civil Engineers, M. P. Besson gave some particulars of the commercial production of radium, which has been undertaken by the Societe Centrale de Produits Chimiques. Only about one-half ounce of the body can be obtained from one ton of the uranium minerals, which form the raw material, and the separation of this one-half ounce requires the expenditure of about six tons of chemicals, while fifty tons of water are used for washing purposes. M. Besson states that the activity of radium is such that it is spontaneously luminous in the dark. This luminescence does not arise like that of phosphorus from oxidation of the body, but is due to a continuous emission of electrified particles. The charge carried by these particles is enormous, but their mass is so small that the loss of weight is only about one milligramme in 100,000,000 years.

THE trolley has done much for the mining countries of the United States. Electric lines, catering to both passenger and freight traffic, are both popular and profitable. Interurban service in the Missouri-Kansas district is excellent, and in the minds of many mining men it is only a question of time until the lines become formidable competitors of the steam roads, owing to the ease and comparatively light expense with which switches and spurs can be constructed. Now the smelters in the vicinity of Denver have discovered that private trolley lines are so successful that several are preparing to equip their plants with trolley freight cars. Three cars, costing \$2000 each, will displace eighteen mules and two steam locomotives, besides the teamster bills, at the smelter which inaugurated the idea.—The Lead and Zinc News.

THE longest electric railroad in the world will be built from Cincinnati, Ohio, to Pontiac, Mich., a distance of about 305 miles, if present plans are carried out. The Everett-Moore Syndicate has obtained control of the Miami & Erie Transportation Company and the Detroit & Pontiac Railroad is extending its line 35 miles from Detroit. The consolidation of the Toledo & Detroit Shore Line and the Toledo & Short Line combined with the other roads of the Miami & Erie Transportation Company, gave the Everett-Moore Syndicate exclusive control of the field. The officers of the company are: W. H. Lamphrecht, president; W. S. Hayden, secretary, and Otto Miller, treasurer. It is estimated that the first division of the line between Cincinnati and Dayton will cost \$3,000,000 for the construction alone.

The Formation of Bonanzas in the Upper Portions of Gold Veins.*

NUMBER II.

BY T. A. RICKARD, DENVER, COLO.

The behavior of such gold ore under metallurgical treatment also suggests strongly that its usual mode of occurrence is analogous to the above example. When gold-bearing pyrite is treated by cyanidation, the gold may be leached out without deformation of the pyrite or any other change in its appearance except the acquisition by its facets of a pitted surface suggesting cavities left by the removal of a soluble constituent. Moreover, there are many mining districts yielding gold from pyritic veins in which the native metal is rarely seen. The ores of Gilpin county, in Colorado, for example, contain an average of from 10% to 15% of iron and copper pyrites; and I know from frequent trial that when crushed and washed in a pan, such material, even though very rich, will not yield a "color," that is, a speck of visible metallic gold. Nevertheless, in the stamp mill these ores yield their gold to amalgamation, indicating by their behavior in this respect that the gold is in a condition of such freedom as to permit its separation by a crude mechanical process, and its subsequent ready combination with mercury so as to form an amalgam.

The gold which occurs thus in the pyrite of the quartz vein is soluble in many natural reagents, some of which are formed in the very process of weathering which leaches the pyrite, while others are known to be present in the surface waters which circulate through the lode fractures under observation at the present day. By whatever means it is dissolved, the gold is then supposed to be carried by the surface waters in their descent toward the groundwater level, where it is precipitated under conditions to be discussed in due course.

SOLVENTS.—In the process of weathering, the pyrite yields many subordinate compounds, such as sulphuretted hydrogen, sulphurous and sulphuric acid, and proto- and sesqui-sulphates of iron. Of the latter, the sesqui-sulphate, $\text{Fe}_2(\text{SO}_4)_3$, is a solvent for gold, and has been cited by Wurtz and Le Conte in early discussions concerning the origin of masses of native gold in oxidized ores. Dr. Richard Pearce, in later years, has frequently drawn attention to the probability that this sesqui-sulphate is a factor in the process of gold deposition.

The gold deposits in the cavernous quartzite of Battle mountain, Colo., have characteristics which appear to confirm this view. In these ores large pieces of native gold, of a nuggety appearance, but really crystalline in structure, have been found associated with horn silver and the sesqui-sulphate of iron. The latter occurs in lumps, mixed with clay; and, although these are very rich in gold, the gold occurs in a form not to be detected by careful panning. Analyses of several lots of ore showed the presence of 12% of the hydrated sesqui-sulphate of iron.

But other solvents capable of doing this work, also occur in nature, and, although the amount of any of them to be detected in existing surface waters may be minute, we have to remember that the processes of nature are permitted so much more time than those of the laboratory that the dilution of the solution is compensated by the quantity of it.

Most writers refer to chlorine as a possible reagent. Such a reference is suggested not only because it is a prominent reagent in the metallurgical practice of to-day, but also by the fact that it has a wide distribution throughout nature in the form of common salt. This is most apparent in arid regions where evaporation causes concentrated solutions to be formed. Thus, in the deserts of West Australia the water encountered in the mines is always brackish, and frequently contains more salt than the sea. The water of the Great Boulder Proprietary mine, at Kalgoorlie, in 1897, contained 6402 grains of common salt per gallon. A considerable amount of magnesium chloride was also present. In some of the water used in the stamp mills, and obtained from temporary "lakes," the salts were present up to the point of saturation, and the liquid carried further salts in suspension, so that the amount reached as high as 30%, rendering the term "brine" more suitable than "water." This liquid contained 17% of salts in solution even when most diluted by recent rains, and it therefore afforded a parallel to the Dead Sea, the waters of which contain from 20% to 26% of salts, of which 10% is common salt. These excessive percentages are not due to the presence of deposits of salt in the rocks of the district, but simply to the concentration brought about by the excessive evaporation which takes place in a hot, arid climate.

Mine waters frequently contain a noteworthy quantity of chlorine, as chloride of sodium. At the Mammoth mine, in Pinal county, Ariz., the water carries five grains of salt per gallon, while the well water, used in the stamp mill, situated in the valley below the mine, contains twice as much. This would be equivalent to six grains of free chlorine per gallon. The larger amount contained in the water from the well, as compared with that in the drainage of the mine, suggests the results of surface leaching. Even

in mountainous districts, such as Cripple Creek, Colo., the mine waters carry chloride of sodium to a noteworthy extent. The water of the Independence mine contains three grains per gallon.

Another suggestive feature is afforded by the abundance of horn silver, or cerargyrite, the chloride of silver, throughout the dry tracts of Arizona, New Mexico and Nevada. Prof. Penrose emphasizes this interesting fact, and connects it with the bodies of salt water which still survive in places as "sinks" and "lakes." Furthermore, the oxichloride of copper, atacamite (which derives its name from the Atacama desert, between Chili and Peru), is frequent in these regions. Another and more uncommon mineral may also be mentioned in this connection. In the Mammoth mine, already cited, and in the well known Vulture mine, both in Arizona, the precious metals are associated with vanadinite, which contains chlorine as a chloro-vanadate of lead, $3\text{Pb}_2(\text{VO}_4)\text{PbCl}_2$. Thus the chlorides of copper, lead and silver are found in the oxidized ores of these regions, while the corresponding combination of gold is absent. The explanation is obvious. The chloride of gold is an unstable and readily soluble compound, while the minerals formed by the corresponding combination with the baser metals are comparatively insoluble in water, especially the chloride of silver, for the abundance of which there is therefore a good reason. It remains but to add that, in several Arizona mines which I have sampled, the ores above the water level carried a notable proportion of silver with very little gold, while in depth the silver contents have diminished and the gold has increased, especially in the vicinity of the water level.

Of the many reagents which would liberate the chlorine from salt, it is only necessary to mention ferric sulphate and sulphuric acid, both derived from the ordinary oxidization of pyrite. The hydrochloric acid thus formed would yield free chlorine in the presence of manganese oxides, which are very prevalent in the upper portions of gold lodes, in the form of the black earthy mineral, psilomelane.

There are other possible solvents, which need not be discussed here.

PRECIPITANTS.—Whatever the solvents which leach out the gold from the superficial portions of the vein, there is assuredly no lack of precipitants. It is probable that the gold does not migrate far before encountering conditions which compel deposition. Even when it is carried to a considerable distance it is most likely that such removal is effected by alternating stages of precipitation and solution.

Organic matter is a probable precipitant for the gold in such surface waters. It exists deeper than hasty observation would suggest. At the Great Boulder Main Reef mine, at Kalgoorlie, I saw the roots of trees which, in their energetic search for moisture, had attained a depth of 85 feet below the surface; and at the Sugar Loaf mine, near Kunanaling, also in West Australia, I saw a similar occurrence at a depth of 74 feet.

Another agency which, under certain chemical conditions, is a probable factor in reducing the gold from surface waters, is pyrite itself. Thus, the gold dissolved from the decomposed pyrite at the surface may be precipitated upon the unoxidized pyrite deeper down. Among the exhibits belonging to the Colorado Scientific Society is a bottle containing cubes of pyrite, on the faces of which crystals of gold are to be seen. They are the result of one of Mr. Pearce's experiments. The gold of a Cripple Creek ore was dissolved by using common salt, sulphuric acid and psilomelane as reagents, the chlorine being thus obtained in a manner analogous to conditions which probably occur in nature. This solution was placed in a small bottle, and to it were added a few large pure crystals of pyrite from the St. Louis mine, at Leadville. After several months the gold became precipitated in the manner described. In this connection the story of Daintree's experiment, which I have quoted before, is worth repeating. In 1871 Daintree commenced a series of experiments at Dr. Percy's laboratory at the Royal School of Mines, London. In a number of small bottles he placed a solution of chloride of gold, and to each he added a crystal of one of the common metallic sulphides, such as pyrite, blende, galena, etc. At the time when Daintree died, a few years later, no results could be discerned; but one of the bottles, containing the gold solution and a crystal of common pyrite, was removed to Dr. Percy's private laboratory, in Gloucester Crescent, and there, in 1885, the experiment was completed by the discovery of a cluster of minute crystals of gold upon the smooth surface of the pyrite. The experiment had occupied fifteen years; and on account of its very length it may be said to have more nearly approached the actual conditions occurring in nature.

In a case like that of the "Indicator," at Ballarat, it may be questioned whether it is the pyrite in the thin seam of graphitic slate or the carbonaceous matter of the latter which causes the precipitation of the gold. Even if the pyrite was the decisive factor, it must be remembered that it, in turn, probably owed its previous deposition to the action of the carbonaceous precipitant in the Indicator seam. This would apply also to the beds of black slate which have had so marked an influence on the occurrence of gold in the Gympie district, Queensland; but it

would not, I think, be applicable to the Rico deposits, where pyrite is not an especial constituent of the black shales, as compared with the sandstone beds of the same stratified series.

SOLUTION AND PRECIPITATION.—It is to be noted that in the two examples of ore-forming processes which have been considered, the gold in the superficial part of the vein is supposed, in one case, to remain in the gossan after the pyrite has been removed, while in the other instance the gold is also dissolved and carried elsewhere. This may appear contradictory. It is a good illustration of the perplexities arising from the application of chemical hypotheses to the theory of ore deposition.

Nature knows no interval of inaction; solution is going on at one time, precipitation at another. The gold is constantly the object of one or the other activity. After the pyrite is removed, or while it is still undergoing leaching, the gold is being dissolved, but more slowly than the baser metals. That which remains to enrich the gossan may well be supposed to be the survival from a larger quantity of gold which has been undergoing slow solution. The gold which was deposited deeper down from the surface waters may, as erosion takes away the upper part of the vein, eventually find itself close to the surface and undergo re-solution. It is a question whether the mining of to-day breaks in upon the gold deposits at one stage or another of a continuous process. The miner finds the balance of gold left on deposit from a current account in nature's bank. Solution and precipitation are everywhere in action; it is the excess of one or the other which determines formation of ores.

(TO BE CONTINUED.)

The Kendall Mines, Fergus County, Mont.*

Written for the MINING AND SCIENTIFIC PRESS.

The recent sale of the Kendall mines, situated in the North Moccasin mountains, Fergus county, Mont., has attracted much attention to those properties because of the large amount for which they were sold and the extensive ore bodies that have been exposed on them by development. What is now the Kendall mines were first located more than ten years ago by prospectors, but no ores of sufficient value to justify development were found at that time. Since then they have been located and allowed to go by default a number of times, until about two and a half years ago they came into the possession of C. Allen and others, who sold them to H. T. Kendall early in 1900 for the sum of \$2150, and thought they were doing well.

The Kendall group consists of two claims—the Klondike and Leaking lodes—and are situated on the eastern slope of the North Moccasin range about 20 miles north of Lewistown. Shortly after purchasing the properties Mr. Kendall erected a cyanide plant, a portion of which is shown by the illustration on the front page, having a daily capacity of a little more than seventy-five tons, and began development on the Leaking vein. The ore was at first extracted from a great open cut on the Leaking vein, illustrated on the front page, which exposed a body of ore more than 100 feet in width, carrying values, of from \$6 to \$8 per ton in gold. The mill was operated very profitably for several months on ores taken from this cut, and in November, 1900, a bond for six months was taken on the properties by Finch & Campbell of Spokane, and work was begun at once to verify the continuation and extent of the ore body. The bond named the price of the mine at \$450,000, and at the expiration of the bond the purchase was completed, and under the new management a thorough exploitation of the ore is being made. A tunnel being driven along the vein from the bottom of the open cut has penetrated the hill 450 feet with no change either in the value or the character of the ore, and several crosscuts from this tunnel have demonstrated the width of the vein to average equally as great as that exposed in the face of the open cut. A winze being sunk in the tunnel 350 feet from the entrance has reached a depth of 65 feet, showing ore all the way down. The bottom of this winze is 175 feet below the apex of the vein.

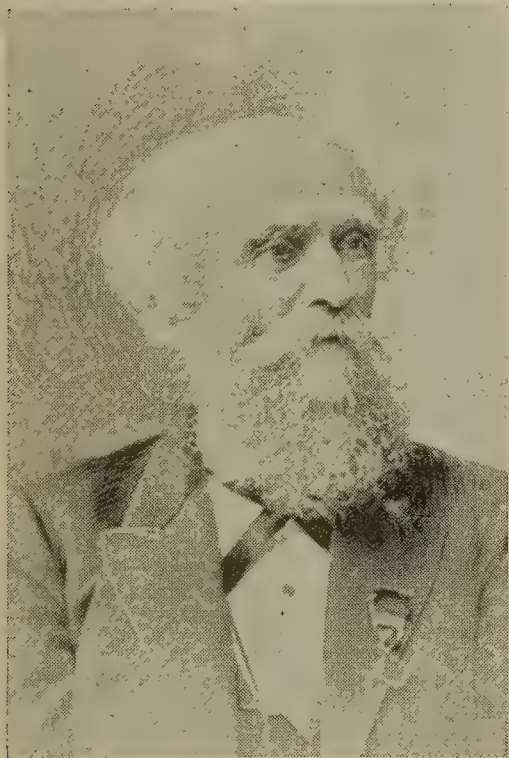
The ore is a contact deposit occurring between lime and porphyry walls, carrying a very small per cent of other minerals than gold. One shipment of bullion from the mill contained $\frac{1}{100}$ of 1% in silver, and this is about the average of the shipments thus far. The cost of extraction and reduction is less than \$1.50 per ton, as there is no waste matter, and the closest possible extraction is secured by the cyanide process, by reason of the ready susceptibility of the ores to that treatment. The present owners have this month organized a company known as the Kendall G. M. Co. for the purpose of operating and developing the properties. The new company is capitalized at \$2,500,000, and many extensive improvements are contemplated during the summer. A large electric plant will be installed to furnish power for mill and a pumping station, and a pipe line will be placed to convey water across the range from Warm Spring creek, 5 miles distant. It is also intended to replace the mill now in operation by an improved plant of the latest pattern having a daily capacity of 300 tons.

*See Illustrations on Front Page.

*Trans. Am. Inst. M. E., Richmond meeting, February, 1901.

The Passing of Joseph Le Conte.

We doubt if the going hence of any other Californian would call for such breadth and depth of mourning as that which follows the departure of Dr. Joseph Le Conte of the University of California. His name is familiar wherever learning finds devotees. His works have commanded respect and admiration everywhere. His charming personality of mind and heart has endeared him to all. While still in full pos-



The Late Joseph Le Conte.

session of his great powers and fame his end came during a visit to the Yosemite valley last week. From amid the majestic mountains he knew and loved so well his spirit took its flight to the Creator's throne.

We are pleased to give our readers a glimpse of his beloved face and to pay our tribute of respect to his memory in words fitly chosen by two men able and fit to speak them:

"In the immediate presence of our great loss, it is Joseph Le Conte as the man, even more than Joseph Le Conte as the scholar, who is in our thought. To those who have known him, who have felt the touch of his rare personality, I must believe it will always remain so. His soul was clear as a crystal. His graciousness of manner was only the reflection of his inner life, which was grace and human kindness personified. A kindly human interest threw its robe over all the framework of his scientific life, and made him, with all his attainments and all his knowledge, a vital, living, loving, helpful human force. He dealt with the world of nature, but its lessons for the life of man, for the cleansing and uplifting of personal and social life, were of immediate importance to his thought. Many among the hundreds who have sat in his lecture room may forget what he taught, none will forget what he was. Even through the pages of his books shone out the warmth of his personality, for there was heart and the fire of life interest in every paragraph he wrote.

"For thirty-two years he has been a great vital power in the University of California. No man can estimate the value of the influence he has exerted. He has been always and everywhere for good and for every good thing. He has believed in the good and has looked for the good, and everywhere good has sprung up by his pathway to meet him. He wasted none of his time and strength in the depreciation of his fellow men. His students knew what he expected of them, and they answered to his faith.

"The habit of his thought was large and catholic. He saw clearly, because he saw in good perspective. He took many things into consideration when he framed a judgment, more things than it is given to men to see and know. It was because of this catholic range of his vision that he could not be narrow, and it was because his human sympathy reached to so many human lives that he could not be uncharitable. We shall not see his like again, but the memory of his life and his life relieved in those he has taught and touched will remain a unifying vital force in the institution to which he gave his best, and a blessing to the world."—BENJAMIN IDE WHEELER.

"The death of Dr. Joseph Le Conte removes one of the foremost thinkers and scientific men of the time—one whose writings and modes of thought have influenced the progress of science all over the civil-

ized world. Educated originally for the medical career, he thus acquired the foundations of the broad knowledge which later made him equally at home in the purely physical sciences and in the biological field. While his geological work is, perhaps, best known to the general American public, through the wide use made of his excellent books on that subject in universities, as well as in the secondary schools, his early and warm advocacy of the doctrine of evolution has probably served most to make him known and appreciated in the Old World, where he was always warmly welcomed and honored in scientific assemblies by the foremost men.

"It was he who first made the University of California known to the outside world as a school and center of science on the western border of the continent, and who kept it in view of the world of science, almost alone, for many years. His connection with it was largely instrumental in attracting to it other men, who otherwise would have hesitated to remove to what was then the outskirts of civilization from their Eastern homes; and his ceaseless scientific activity acted as a stimulus both to his colleagues and to the students under his instruction, whose affection and esteem remained with him through life.

"It is not easy to overestimate the influence he has exerted in rectifying the popular idea that the doctrine of evolution necessarily tends to materialism, if not atheism. So far from this, he regarded it as inculcating the highest ideal of a world plan, and he staunchly maintained not only its compatibility with religious belief, but that it offered a much higher point of view than could be derived from any of the orthodox doctrines by elevating nature into the realm of teleologic thought and aspiration. This part of his influence will, perhaps, be most missed in the present state of scientific thought. His death brings heavy loss not only to the University, but to the world of thought at large."—E. W. HILGARD.

The Labor Question in Rhodesia.

TO THE EDITOR:—This last six months the labor problem has been the burning question of the country. The labor boards, both in Salisbury and Bulawayo, have practically done nothing but discuss this question. First, the northeast coast native was the favorite and a trial consignment was ordered. On their arrival at Beira they first showed signs of having been deceived, which resulted in some of them being killed. On their arrival in Salisbury the same trouble arose, but, luckily, didn't go far and eventually the consignment was delivered. How they have fared since the newspapers do not tell. At any rate, it was thought best not to try another lot. Then arose the question of "Who next shall we try, as we have proclaimed to the world that the native labor question is the only thing that is retarding our mines, and unless we do something the English public will not keep on putting up the money for our salaries?" etc. The Indian coolie was produced, but didn't receive much encouragement. After him the "deluge" in the form of John Chinaman. This last is still being discussed, and, from all communications one sees in the papers, by people who have never had anything to do with him. While all this discussion is going on there is any amount of native unskilled labor laying around and only wants teaching to make it good. One of the great troubles with both mine managers and the so-called miners who have to handle this raw material is that they are looking for an article that isn't there and has to be made. They expect a "boy" to go below at once and be able to put in a 3-foot hole, never taking it into consideration that the "boy" most likely has never seen either a shaft, a drill or a hammer before in his life. The drill and hammer are put in his hands, he is shown where to put in his hole and told to go ahead, most likely in a language he doesn't understand, and the chances are that if he doesn't do the work in a "miner-like" style he is kicked and cuffed. In South Africa there are thousands of natives who know how and where to put in holes to the best advantage—indefinitely better than their white "boss." These "boys" must have been taught by some one, and the Rhodesians must do the same. Unfortunately, there are very few of them who can do it. The "boy" is an infinitely quicker learner than the average white man. You can with trouble teach a "boy" to be a good driller in a month's time, but it is doubtful if you could take an average "granger" or "yokel" and do the same. The nigger also learns very quickly when pay day ought to come round, and is just as keen as any white man about getting his money, and he soon finds out that drill "boys" get more than surface "boys." So long as a mine is fairly dry he very soon wants to go below and get more money. He is also shrewd enough to know at which mine he gets the most food and the least amount of kicks. He is also quick at "sizing" up his boss, and knows when he can loaf and when he has to work, and whenever he knows he has done wrong and gets punished for it takes it all in good part, but soon quits when it is the other way about. The principal things a manager has to see to, if he wants to get and keep "boys," are regular pay days, proper amount of food, fairly good accommodations and just treatment. The contractors—or at least some few

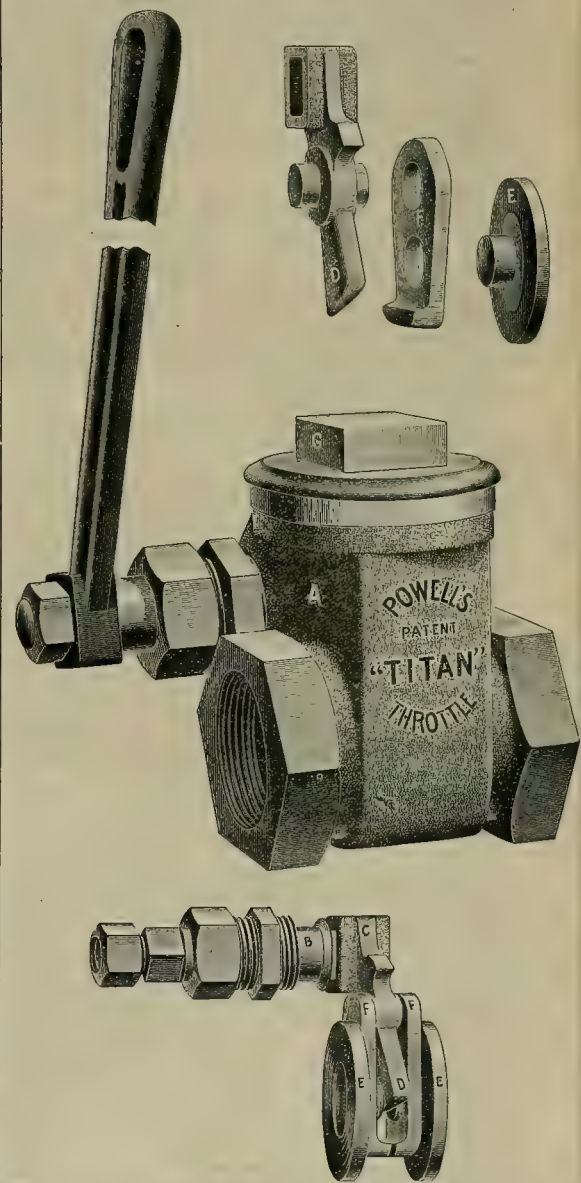
of them—and the so-called prospector are the principal culprits in causing the scarcity of labor. Directly a mine gets a bad name among the natives—and the natives are great talkers and travelers—it is goodbye for that mine. The one great trouble with the native is that he never will, however well he is treated, stay very long in any place. House "boys" are just as bad as mine "boys" in that way. Their wants are few and easily satisfied, and if the native could ever be educated to "want more" the labor difficulty would be nearly solved. Now, as soon as he has enough money to pay his hut tax and buy a wife he is perfectly satisfied, as a blanket and a few yards of "limbo" are all the clothes he wants.

MINING ENGINEER.

Gadzenia, Rhodesia, S. A., May 20.

Powell's New Throttle Valve.

Herewith is illustrated a new departure in construction of lever throttle valve which has just been placed on the market by the William Powell Company, Cincinnati, Ohio, who claim as points of superior excellency of the valve that it closes tight when the lever is moved full stroke and the valve shut; that it will not leak; the construction is such that it opens with ease under pressure; and that the slightest movement of the lever releases the disk, the wedge is withdrawn, while the disks are still at rest, equalizing the pressure so as to make a further movement of the lever without any effort. This con-



struction, especially in the larger size, dispenses with the by-pass. The valve is also warranted not to stick or jamb. The construction is such that they are very durable. They can also readily be repaired as all the parts are made to gauge and readily interchangeable.

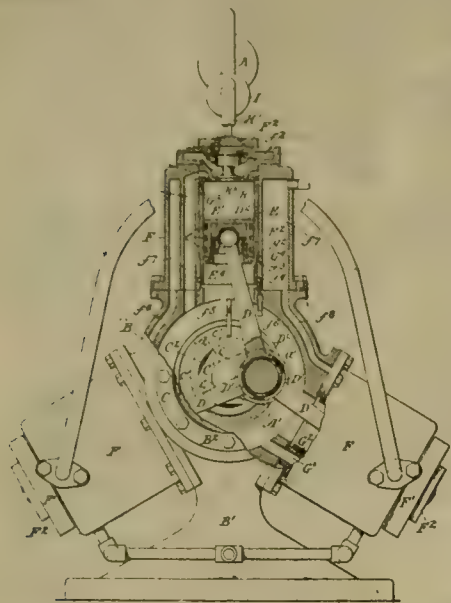
A is the body or shell, B is the spindle, C is the carrier, terminating in a tapering wedge D, F-F are two links loosely coupled to the carrier at its upper end, while the lower ends of the links engage the studs of the disks E-E. The wedge D gets in its work upon the disk studs only as the rotation of the spindle reaches a dead center in the downward stroke. The reverse movement of the carrier, it will be noted, first lifts the wedge from between the disks before the latter begin to move, then, as the disks fall lightly away from their seats, they are carried up to full opening, absolutely without friction on the seats.

Mining and Metallurgical Patents.

Patents Issued July 2, 1901.

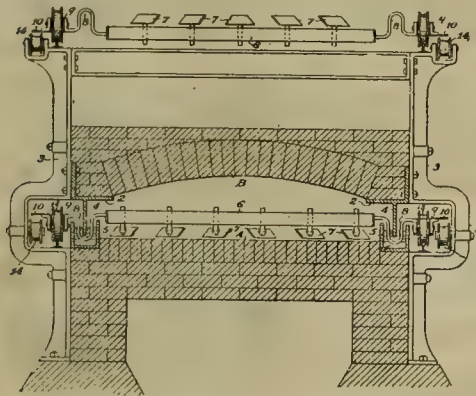
Specially Prepared for the MINING AND SCIENTIFIC PRESS.

COMPRESSOR.—No. 677,503; W. J. Francke, New Brunswick, N. J.



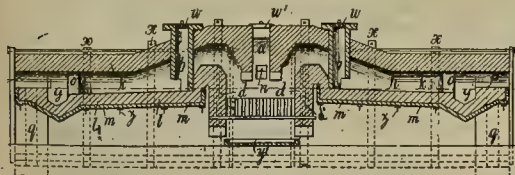
The combination with piston, cylinder, an annular suction valve port and discharge valve port in cylinder head, and discharge valve, of an open-ended sleeve valve surrounding piston and operated by friction thereof to control suction port, a closed annular cushioning-chamber between adjacent walls of sleeve and cylinder to cushion return movement of sleeve, an oil separator, a pipe connecting separator with discharge side of cylinder head, an oil pipe leading from separator to cushioning chamber, and a reducing valve in oil pipe and having controlling means whereby pressure exerted in cushioning chamber on sleeve valve may be increased beyond suction pressure under which machine is operated and thereby to close suction sleeve valve.

ROASTING FURNACE.—No. 677,510; B. Hall, Nevada City, Cal.



A chamber having stirrers or scrapers adapted to move over floor of furnace, tracks parallel with and exterior to furnace, trucks or carriages mounted and movable upon tracks, arms connecting exterior trucks with interior stirrers, troughs or channels between trucks and furnace chamber containing a substance which will form a seal, and plates centrally disposed with reference to troughs and dipping into contained substance, arms connecting carriage with stirrers being bent so as to dip into substance in troughs, whereby a seal is effected.

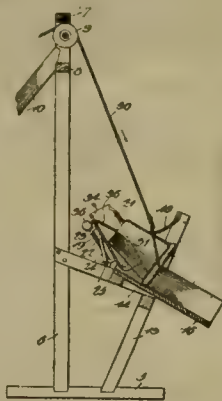
APPARATUS FOR THE TREATMENT OF ORES.—No. 677,614; J. Armstrong, Ealing, England.



A grate capable of holding considerable thickness of fuel, charging hopper for supplying fuel without admission of air, a bridge, a deep hopper having an opening at bottom beyond bridge for admission of pulverulent charge with smallest practicable quantity of air, a working hearth, a sump beyond working hearth, draft flues beyond sump, and working door beyond draft flues whereby air is prevented from entering either at the sump, working hole, or charging orifice in deleterious quantities, as any air seeking to enter door escapes through draft flues in-

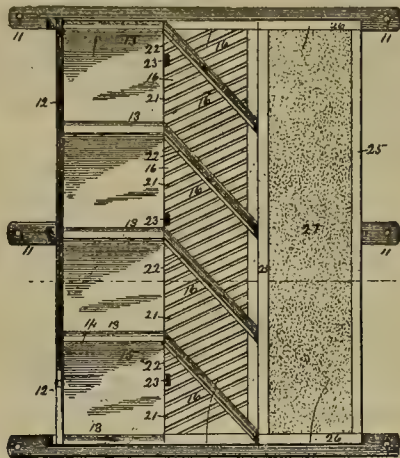
stead of entering furnace in direction contrary to draft and uncombined oxygen is kept from entering at grate or fuel entrance.

APPARATUS FOR GOLD MINING.—No. 677,560; M. Covel, Chicago, Ill.



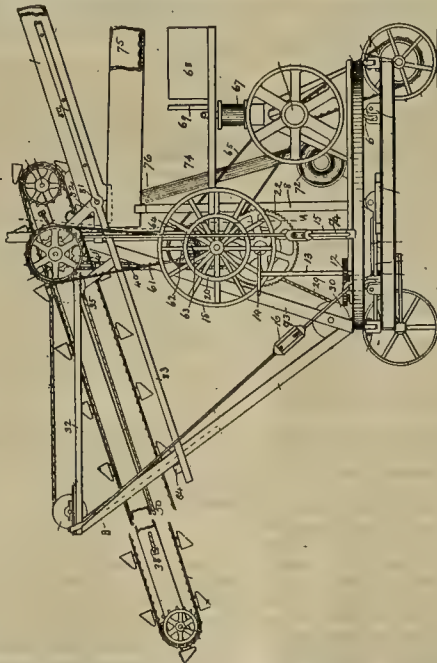
An ore washer to be located on beach in position to utilize wave action, and comprising a table bed, on which gold-bearing earth is deposited, a riffle frame, located one step lower than bed and a reversible fabric pad, located in turn a step lower than riffle frame and all joined together edgewise and adapted to receive the wave action endwise.

ORE_BUCKET DUMPER AND CHUTE.—No. 677,537; L. Collier, Cripple Creek, Colo.



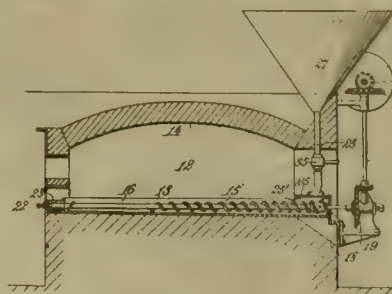
A fixed chute section, a chute section pivoted to fixed section at its rear end, the pivoted section having a notch in free end, bucket having button attached to and suspended from bottom, connecting medium for button being adapted to engage in notch, to hold bucket while being dumped into fixed chute section.

EXCAVATING AND GOLD SAVING APPARATUS.—No. 677,844; J. C. des Granges, San Francisco, Cal.



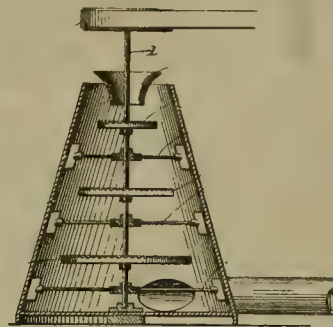
A truck, turntable revolvably mounted thereon, sluice box stationarily supported upon truck, excavator mounted upon turntable, excavator comprising traveling buckets and support therefor, and chute also mounted on turntable, buckets at upper end of excavator discharging into chute and chute discharging into sluice box, support and chute vibrating parallel with each other about horizontal axes.

ORE ROASTING FURNACE.—No. 677,701; J. Roger, Denver, Colo.



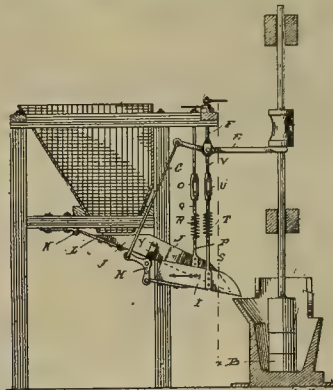
In an ore roasting furnace, roasting hearth and feed screw located below and coextensive with hearth transversely thereof, feed screw being tapered from ore receiving end toward opposite end.

PULVERIZING MILL.—No. 677,702; W. M. Russell and F. P. Bixon, New York, N. Y.



Vertical imperforate casing which expands gradually downward and inner walls of which are straight, casing having inlet at upper part and outlet at lower part, vertically disposed shaft journaled in casing, arms extending from shaft in groups or series, arms of one group or series being shorter than those of group or series next below, bats carried by arms, bats of one group or series being nearer shaft than those of series next below, and obstructions within casing located between groups or series of arms and above upper group or series, outer surface or periphery of one obstruction being nearer shaft than that of obstruction next below and also within plane of the bats next below and at distance from walls of casing, whereby material passing downward through casing is caused to move outward and away from shaft.

FEEDER FOR STAMP MILLS.—No. 677,795; A. C. Pratt, San Francisco, Cal.



The feed spout hinged thereto and having outer end vertically adjustable and spring-supported, dropper spout having movable hinge connection at rear end to feed spout, and front end vertically adjustable and spring-supported independently of feed spout lever connection from stamp rod to movable hinge of dropper spout, and means for adjusting hinged position of dropper spout.

A GERMAN IMPERIAL COMMISSION, which has been experimenting with coal dust in furnaces, in a recent report specially mentions the Schwarzkopf apparatus. In the operation of this it is stated that it is necessary, in the first place, to have a highly heated fire chamber for the ignition of the coal dust, for, the higher the temperature, the quicker and more perfect will be the combustion. Contact with the boiler walls must be guarded against, as this interferes with ignition; the fire chamber must be lined with fireproof material, as it has to be kept constantly at a fixed temperature. It is pointed out that such a fire chamber is not an inconvenience, but rather a special advantage in coal-dust firing, because it insures perfect combustion, a high temperature of the gases at the start, and protection against the formation of "needle" flames. Also, after firing has ceased—for the night, for instance—the heat stored in the fireproof walls maintains steam pressure longer and steam is more quickly raised in the morning.

MINING SUMMARY.

Specially compiled and reported for the
MINING AND SCIENTIFIC PRESS.

ALASKA.

COOKS INLET.

C. C. Weathersfield is said to have taken out \$200,000 recovered from his mines in the Turnagain Arm district. He reports that a great strike had been made on Bear creek, \$150,000, it is stated, being taken out of one pocket, and in speaking of the district said: "There were a great many new strikes made last fall on streams supposed to contain no gold but which are now paying very well, running from \$3 to \$5 per yard and more. There was picked up on Crow creek an \$84 nugget.

KETCHIKAN.

The Alaska Copper Co., Judge Mellen, Juneau, manager, and C. F. Reynolds Supt., has shipped forty tons of ore from Copper mountain, Prince of Wales island. The two trams are working perfectly. R. H. Gibson, foreman, has finished the ore bunkers and is running the sawmill. Work has been temporarily suspended in the 400-foot tunnel and the crew moved on top of the mountain to do surface work.

NOME.

N. B. Solner, manager of the Bank of Nome, says that he has bought \$100,000 worth of gold dust during the winter taken out by pan and rocker. Reports from Council City and Topkok state that the spring cleanup will approximate a half million dollars. From prospecting already done in the Bluestone and Kougak districts there will be numerous rich gold bearing creeks developed during the coming summer. In the Bluestone district, Gold Run and Adler are known to be very rich. Litigation, it is anticipated, will retard the growth of this district, owing to claim jumping.

PORCUPINE.

J. F. Malony, Juneau, who has just returned from Porcupine, says: "The Mix Bros. are taking out all the way from \$500 to \$1350 a day, working two men on each shift. Wiley & Finley have five men at work and are taking out from \$300 to \$500 a day. On Discovery, worked by Dalton and myself, we took \$2000 out of a space on the bedrock 10 feet square. We have twenty-five men at work. Ross & Smith, on No. 1 below are taking out a great deal of dust. On No. 2 below, Misam and his partner are sinking a shaft. There are a number of men working on the benches taking out dust in good quantities. On McKinley they are just opening up. Everybody in the district is immensely pleased with the outlook."

YUKON.

A strike is reported on Trail creek, a tributary of the left fork of the Chandelar river in the Koyukuk, made a year ago, but the secret guarded by the discoverers and those interested until now. According to the latest reports received it is a big payer.

ARIZONA.

COCHISE COUNTY.

(Special Correspondence).—The Copper Glance M. Co. is 7 miles southeast from Bisbee, on the new Arizona & Southwestern Railroad. The officers visited the property on the 6th to select a site for the sinking of a double-compartment shaft.

Bisbee, July 7.

A report from Dragoon states shaft No. 1 on the Copper Chief claim was down 235 feet, and that the Copper Queen tunnel was in 65 feet. Also that the owners and the Copper Crown of Arizona Co. will put in additional machinery. The new railroad to be built from Cochise, Ariz., to La Cananea, Sonora, Mex., will pass near the properties.

GRAHAM COUNTY.

The Home Copper Co. organized at Morenci by electing J. H. Belton president, R. H. Waugh secretary and treasurer, and J. Moldor Supt. The company own a group of thirty claims and a mill site on Eagle creek, Morenci district, with considerable development work on some of the claims. A new whim has been put on the main shaft of the Peacock, now down 125 feet.

CALIFORNIA.

ALPINE COUNTY.

G. Monroe is reported to have made a rich quartz-gold strike in the Mogul mining district, under an old coal pit, surrounded by abandoned prospect holes.

BUTTE COUNTY.

The Wagner mine, at Morris Ravine, near Oroville, has been bought by the Sunset M. Co. of San Francisco. The mine will be re-equipped with an electric hoist.

The Supt. will be I. A. Pease. The mine will be re-christened Old Glory.

EL DORADO COUNTY.

The new 20-stamp mill at the River Hill mine, Placerville, is completed and the new hoist is being put in, to which will be added a new compressor and dynamo. Development work has been started on the Lucky Star mine on Poverty Point.

GLENN COUNTY.

A copper deposit on Stony creek is to be opened up on a working bond.

MARIPOSA COUNTY.

The Merced G. M. Co. has not as yet planned to increase the milling capacity. Shaft is down to the 1200-foot level.

NEVADA COUNTY.

A. J. McCuskel of San Francisco, Supt. of the Golden Treasure mine, at Grass Valley, states that under his direction the mine will be fully prospected. It adjoins the W. Y. O. D. and is owned by the California Construction Co.

PLACER COUNTY.

The Sailor Canyon Gravel M. Co., W. Duffey Supt., has opened the channel 800 feet in by an upraise of 16 feet.

E. M. Armstrong is manager of a company developing the Blue Hill gravel mine at Canada Hill. A channel 120 feet in width with good gravel has been prospected through an incline and a 1600-foot tunnel is being run to open it up.

The Canada Hill Gravel M. Co. has thirty men working on a channel 60 feet wide. The tunnel is in 1600 feet. The mill is running steadily. A reservoir will be built this summer on Robinson Flat. The estimated cost is \$10,000. R. Jones is Supt.

The compressed air power plant at Red Point mine is operating successfully. The Red Point Co. is now mining gravel 3 miles underground from the mouth of the main tunnel. An average of 120 cars of gravel are taken out daily in trains of sixteen carloads. The gravel is all free-washing. J. A. Ferguson is Supt. and seventy men are employed.

R. J. Trimble, Supt. of the Southern Cross quartz mine, near Towle, expects to have a new 10-stamp mill installed within the next sixty days. A 4-foot ledge of rich quartz has been opened for stopping.

A tunnel at the Central quartz mine, in Humboldt canyon, near the Pioneer, is being run to cut the vein 400 feet deeper than the present workings. It is expected the ledge will be reached by running 40 feet more.

SAN BERNARDINO COUNTY.

From the Buckeye, at Ludlow, ore is being shipped to the Barstow reduction works. On the west end several open cuts show a body of ore fully 40 feet across. Contracts have been let for the development of water, which if successfully developed thirty stamps of the mill will be removed from Barstow to the mine.

Four men are doing development work on the Roosevelt claims adjoining the Buckeye on the same ledge.

It is reported that the Rose gold mine, 55 miles east of Victor, has been bonded to H. B. Starbird, who has started work. The dump of tailings will be cyanided.

The 40-stamp mill of the Gold Mountain M. Co. is making regular bullion shipments.

W. L. Malone, president of the Bullion G. M. & M. Co. of Ontario, says a good streak of pay ore had been struck in the company's Mother Lode mine out on the desert, at a depth of 125 feet.

The pipe line put in by the Brooklyn M. Co. at Dale is said to be a success, and sufficient water is delivered to keep the O. K. and Brooklyn mills running continuously.

SHASTA COUNTY.

Capt. J. R. De Lamar has bonded the Arps group of fifteen claims near Copper City from W. Arps, R. M. Saeltzer, J. Kahny and A. Jaegel for \$75,000. He has also bonded the Michigan group of four claims, adjoining the Bully Hill mine, from J. Connors of St. Ignace, Mich., for \$25,000.

The original Bullychoop mine and the Cleveland Con., which adjoin each other on the line between Shasta and Trinity counties, are reported about to be sold at a price said to be in the neighborhood of half a million. The present owners of the Bullychoop, of which J. S. Childs is manager, may buy the Cleveland. But report has it that both mines will be sold outright to another Eastern company. These properties are big low-grade gold mines. The Cleveland, which was last worked by W. R. Beale under a bond in the sum of \$250,000, is owned by C. Foster of Corning, the Hart estate and others. The Bullychoop, which J. S. Childs bought for his company two years ago, has been worked and paid steadily. A 10-stamp mill is now running on ore from a 30-foot vein upened up by tunnel for 450 feet. The ore is said to run from \$5 to \$6 per ton. The monthly output of the mine is \$5000 or \$6000.—Sublett's Texas Jack claim, ad-

joining the Bullychoop, with five men and a 3-stamp mill, made a cleanup for May of \$1750.

The claims of H. C. McClure, at De Lamar, have been bonded for \$55,000. He owns four claims and 160 acres of railroad land, and nearly all the stock of the Pioneer M. Co., which owns four more claims. C. D. Porter, representing Washington people, has the option, which is for one year, payment being made on account.

SIERRA COUNTY.

W. Zuver of Auburn and the Messrs. Charters of Cleveland, O., are developing a copper mine near Downieville. At present 100 tons of ore are being shipped to the smelting works.

SISKIYOU COUNTY.

The Yreka M. & M. Co. is operating the Ball mine, near Rollin. The water season ended June 24th and the mill was closed down. During the season 5800 tons of ore were crushed, producing a little over \$60,000, including gold in 100 tons of sulphurets. The company intends to work men developing the mine and taking out ore for the next water season. The vein in the main shaft is developed about 130 feet in length, averages from 3 to 4 feet in width, and mills \$50 a ton. The company intends to install an assay office and canvas plant for sulphurets before next season's run.

At the Black Bear they are sinking the main shaft and the work is progressing satisfactorily.

At the Welker & Banche, adjoining the Ball mine, the arrastra has been shut down for the season on account of power giving out.

The placer mines in Sawyer's Bar and on the Salmon river are all being worked.

The dredger boat at Callahans is completed and the pit is full of water for floating it; the machinery is now on the ground and it is expected that the dredger will start in August. M. F. H.

Yreka, July 7.

TRINITY COUNTY.

H. Z. Osborne of Los Angeles and his partners, who bought the Lawrence mine on Coffee creek, near Carville, in the last week of June, are said to have taken out gold equal to the price they paid, the mine having been producing \$2500 per day from a rich seam. G. L. Carr, who owns the adjoining Yellow Rose of Texas mine, is sinking to find ore similar to the strike in the Lawrence at the same depth.

C. D. Galvin, manager of the Galvin dredger, Weaverville, has bonded, located and bought 1700 acres of what he believes to be the same channel, reaching from the southern boundary of the Sweepstake to the Trinity river.

F. Hall and R. J. Anderson of the Sweepstake Co. have bonded the Humboldt P. M. Co.'s holdings on Buckeye and have located 4160 acres additional, securing all the hitherto vacant mineral ground from Rush creek to Stewart's Fork—the up-stream extension of the Sweepstake channel, it is believed.

TUOLUMNE COUNTY.

F. Plummer and partner have taken out over \$1000 worth of gold from the Telephone mine, recently located by them, near Carters.

The Tazny pocket mine, near Sonora, is being operated under lease by Birney, Munroe & Co.

A rich strike has been made in the Sugarman pocket mine, on Bald mountain, near Sonora. The mine is owned by J. H. Neal, but worked under lease by Smith, Watson & Herold.

Thirty men are employed at the Republican mine, Sonora, under Supt. McGovern, crosscutting, drifting and stopping on the second, third and fourth levels. The 10-stamp mill is running.

Dondero & Son of Yankee Hill, near Columbia, have made a partial clean-up at their gravel claim after a seventy days' run. The head box and 100 feet of flume produced gold valued at from \$22,000 to \$25,000.

J. V. Loney, foreman of the Grand View gravel mine, Montezuma, says the company is driving a tunnel, now in 140 feet, under Table mountain. They have 20 inches of pay gravel in the face which goes \$2.50 to the car.

COLORADO.

The Dorcas mill at Florence has made contracts with Cripple Creek mines for all the ore it can treat, about 100 tons a day. The Dorcas is not in the new combination.

BOULDER COUNTY.

The Caribou mine dump at Caribou is being negotiated on lease. It contains about 500,000 tons and is one of the largest in the State, and accumulated at a time when the mining value of shipping ore was \$80 per ton. The property is part of the estate of the late R. G. Dun of New York.

CHAFFEE COUNTY.

J. D. Spellman, of Rutland, Vt., and E.

D. Kennedy of New York City, are planning to buy seven claims on Mt. Carmel, near Buena Vista, and to develop them by a tunnel. They propose to put on a plant of machinery at the mouth of the tunnel.

EAGLE COUNTY.

Johnson & Duffburg have leased the Warrior's Mark at Red Cliff and are doing the preliminary work of reopening the mine. They estimate that 50 feet of a drift will reach the ore shoot.—Hokenson & Turner, of Leadville, are reopening the Water Nymph.—The Mathias interest in the Last Chance lease has been bought by W. Greiner, and the lessees, starting work at 25 feet from the surface, struck an ore shoot giving good assays.

GILPIN COUNTY.

Some Central City school boys are picking over dumps during vacation and making very fair pay. One young fellow has received \$108 for three weeks' work, after paying 30% royalty, thus averaging \$6 per day.—The Raven mine in Russell district, near Central City, has been bonded to Denver people at \$40,000.

LAKE COUNTY.

Mitchell Bros., locators of the Mahala mine, have sold twelve-thirteenths of it for \$95,000. The thirteenth interest, stock held at Boston, and the Mahala M. Co. remains intact.

A company of Leadville and Toledo, O., people, has incorporated as the La Belle M. & M. Co., to operate the Black Prince mine of Leadville. J. W. Cummings of Leadville is a director of the company. Though little development has been done on the property it has, during the past five years, produced about 7000 tons of ore that have netted \$11.15 per ton from the smelters.

OURAY COUNTY.

The Camp Bird Ex. Co. at Ouray have started work on the Monument claim and propose to erect a mill during the summer on it. The company will soon start the driving of a tunnel to the Imogene basin to open up the several veins on the mine.

PARK COUNTY.

The Excelsior mine has been sold for several hundred thousand dollars. It has been opened for over twenty years and is equipped with a mill and tramway, but has not been operated for about seven years, the ore being refractory. Recent experiments have shown that by treating the ore chemically the values can be extracted at a handsome profit. It is said that the purchasers, who comprise a Denver and St. Louis syndicate, will at once put in a cyanide plant for the treatment of the ore.

The construction of a matte smelter for ores from the Alma district is projected. Tests of the ores have demonstrated that they are not suitable for concentration, and that either a cyanide mill plant or a matte smelter, the latter possessing an advantage in extraction over the former, is necessary. The proposition also includes an elevated electric tramway from the head of Montgomery creek to Alma junction.

SAGUACHE COUNTY.

B. J. Hillman of Victor reports a mining excitement at Indian creek, about 4 miles from Bonanza, based on float that runs twelve ounces gold and ninety-seven ounces in silver to the ton.

TELLER COUNTY.

Dalzell & Wilson of Cripple Creek, operating the lease on Vindicator shaft No. 11, are working ore in the 350-foot level, the shoot varying up to 3½ feet in width and carrying from an ounce and a half to two ounces of gold to the ton.

Dr. Cone, who exploited the Doctor mine, is installing an electric hoist on the Ophir claim at Victor and will operate the property, which has been closed down.

A 100-ton shipment of ore, averaging \$35 per ton, has been shipped from the Hoosier property of the Grafton Company. The bulk of the ore is from the 200-foot level, and some good mineral is being taken from the 400-foot depth of the workings.

IDAHO.

BLAINE COUNTY.

The agreement between the London, England, owners of the Minnie Moore group to sell to E. A. King of Chicago, Ill., and R. T. Austin of Kansas City, Mo., the Minnie Moore mine and improvements for \$30,500, of which \$2000 is paid, and the balance is to be paid in three payments with interest, closing in eighteen months, has been recorded.

BOISE COUNTY.

E. F. Blaine, Supt. of the Twin Sisters mine, near Idaho City, and R. Nye have sold the Oakes-Smith placer mine, near Centerville, to Illinois parties, reserving this year's run. Four water rights go with it, together with 45 miles of ditches. A new quartz discovery has been made

near Summit Flat, some 25 miles from Idaho City, by M. Graham. The ledge is 6 feet wide and the quartz shows free gold. The construction of a 5-stamp mill is projected.

CUSTER COUNTY.

L. Price of Hailey and eight men are on the Valley Creek mine, near Challis, and have begun its active operation. The ledge is 90 feet wide where it has been uncovered. The rock carries a little lead and a trace of copper, but gold values predominate.

KOOTENAI COUNTY.

The Funston M. Co. has been incorporated by P. Bach of Douglas county, J. R. McBride of Spokane and H. Belaine, F. H. Stokes and S. W. Smith of Kootenai county, capital \$5000, to operate the Hidden Treasure and the Copper King claims, in the Priest river district.

The Weber mine, on Lake Pend d'Oreille, is being reopened by F. Weber, S. Donnelly and A. B. Campbell of Spokane, Wash.

SHOSHONE COUNTY.

A. L. Halteman of Spokane, Wash., manager of the Eureka-Pacific placer mines, expects to turn on the water and hydraulic this summer.

A. M. Holter of Helena has bonded a controlling interest in the Alice group, near Wallace, and will sink a shaft on the ore body, which is 2 feet in width, assaying 70% lead and sixty ounces silver per ton. Mr. Holter will form a company to work the claims.

MICHIGAN.

HOUGHTON COUNTY.

At the Adventure the walls of the lower part of the mill have been laid and the floor piers are now in place. Excavations for the pump and boiler house are completed.—The Trimountain mill site is prepared for the foundation.—At the Champion mill site the excavation is under way.—At the Baltic the mill building has been completed and the foundations for the two heads of stamps put in. The mill will be ready to go into commission Sept. 1.

MONTANA.

BEAVERHEAD COUNTY.

W. A. Heimbuecker, assistant superintendent of the Montana C. & G. Co., which is developing the Manser group, near Dillon, reports that the new machinery is all in successful operation. At present the old shaft on the Ballarat claim is being enlarged to a double-compartment one. It is the intention to sink to a depth of at least 600 feet.

BROADWATER COUNTY.

W. J. Merritt, manager of the American Ex. Co., is operating the Kent group on Eagle creek. He is driving a 500-foot tunnel to tap the lead 187 feet below the present workings. The same company have bonded the Woods group, and are deepening an incline shaft to develop it. The company are also working on the Looking Glass claim, near Hassel.

The old placer mines of St. Louis gulch are being reopened to work the bed rock. The soil and gravel is 40 feet thick above bed rock. The operator, J. E. Wilson of Helena, believes that if the water supply holds out he will clean up \$500,000 worth of gold dust during the present season.

FLATHEAD COUNTY.

S. Sanford, manager for the Blackwell Co., and Contractor Cowell have begun the new improvements for that company at West Fisher.

GALLATIN COUNTY.

It is reported from Three Forks that the Ruby Dredge Co. has started working in the Missouri river below Three Forks. The dredge being used has a capacity of about 12,000 yards of gravel daily and is provided with appliances which save the fine gold.

Dr. McCoy and Mr. Klein of Belgrade have struck a lead of corundum in the Harris Kirk mine, in West Gallatin district, which they are working under bond. It is stated that a mill and other plant will be built.

JEFFERSON COUNTY.

L. S. Wild of Helena has leased the Cape Nome placer, located near Bernice. He will work a large vein of decomposed quartz in the ground. The ore is very soft and is claimed to average about \$10 in gold per ton. He will reduce the ore in an arrastra on the claim.

MADISON COUNTY.

The Newell Leasing Co. of Colorado Springs has bought the Oom Paul group in the Red Bluff district, and is starting development on an extensive scale. The claims are prospected by surface openings and show a vein of gold-bearing ore.

MISSOULA COUNTY.

T. S. Letterman has bought from D. A. Stewart his interest in the Barrette placer mining ground near Martina. A gold

dredger similar to the one now operated by the Western Montana M. P. Co. will be put on the claims.

SILVER BOW COUNTY.

The Speculator M. Co. has been incorporated by J. A. Creighton, J. M. Dougherty of Omaha, Mrs. L. F. Largey, B. Noon and W. W. Wilson, with a capital of \$150,000, to operate the Speculator mine at Butte.

N. A. Hall of Starvation Flats, on Dog creek, has found an artificial placer deposit upon his claim, consisting of tailings from the Penobscot mine deposited among the grass and willows. There are 10,000 tons of the tailings on the placer ground, which by cyaniding can be worked at a net profit of over \$1 per ton.

The total net earnings for the year of the Butte mining companies reported were \$15,949,735, an increase over the previous year of \$1,893,455. The complete figures are:

Anaconda C. M. Co.	\$5,571,815
Boston & Montana	7,042,300
Butte & Boston	586,055
Lexington	6,500
Speculator	175,000
Colorado	303,620
W. A. Clark (royalties)	2,510
Colusa-Parrot Co.	245,400
Snohomish & Tramway mines	53,300
E. D. Lassen (Neva mine)	2,600
Montana O. P. Co.	1,250,000
J. A. Murray (royalties)	340
Parrot Co.	510,195
W. W. Wilson (Oneida mine)	100

Operations on the Ophir mine at Butte have been suspended. It is owned by G. E. Blackburn of Butte, but was operated by a Kansas City company. A. Clark was superintending the work.

TETON COUNTY.

Work has been begun on the property of the Michigan & Montana C. M. & S. Co., recently consolidated with the A. M. Esler M. Co., near Altyn. Men are stopping ore preparatory to starting up the 10-stamp mill and concentrator.

NEVADA.

ESMERALDA COUNTY.

The Vulcan Con. C. Co., incorporated in West Virginia, will develop the mines at Siegelton, near Sodaville. Extensive improvements are projected. It is the intention to erect a smelter at the mines and put in a pumping plant to force water a distance of 6 miles to it.

NYE COUNTY.

J. F. Anderson, of the people who have bought the Tonpah mines, says that they propose to construct a railroad from Soda Station to the mines at Butler. The smelter returns from 432 tons of ore shipped are \$92,112.09. It is estimated that there are 2500 tons of \$60 ore on the dumps, making a total of \$240,000 thus far mined.

WASHOE COUNTY.

The Empire C. Co. of S. D. has bought the Crown Prince, J. & K. and nineteen other claims at Pyramid. The president of this company is C. S. Palmer; J. H. Robley of New York is secretary and treasurer, R. W. Parry of Reno is Supt. of the mine. Men have been put to work cleaning out the J. & K. tunnel and laying track to the breast.

The Hurricane claim, 3 miles north of Reno, owned by R. Mitchell, W. Prince and J. Cusick, is working five men and is down about 50 feet. On the surface the formation carried an ounce or two in silver and a trace of gold. It is now yielding from \$6 to \$8. The owners expect to sink a few feet farther and then drift.

At the Bell mine at Wedekind C. B. Bell is manager and Supt., E. Crane is foreman and J. M. Libbey is assayer. Three cars of ore are shipped weekly that average about \$1000 a car net. Returns on the last four cars were respectively \$1326.12, \$880.17, \$729.35 and \$1073.52. Preparations are being made to sink a double-compartment shaft to enter the ore body 600 feet down.

Darling & Gutling, receivers of the new smelter, have sold it to people represented by M. D. Young, who have bonded the copper mines at Pyramid Lake. The plant will be started up immediately. The amount paid for the plant was about \$4000.

NEW MEXICO.

LINCOLN COUNTY.

The New Mexico M. & M. Co. is working its Turkey creek property in the Nogal mining district. It is reported that a mill, tramway and water pipe line will soon be constructed.

GRANT COUNTY.

P. T. McGrath for a Boston syndicate has bought a large acreage of copper bearing mining land on which he states \$200,000 is to be expended in development.

T. Parker, who owns several turquoise claims adjoining the Azure M. Co.'s property, near Silver City, is working eleven men. In the White Signal district, south

from Silver City, J. Jeffers has bonded a turquoise claim to Eastern parties who are arranging to commence development at once.

OREGON.

BAKER COUNTY.

(Special Correspondence).—The Bald Mountain mine and mill are situated about 3 miles southeast from the Mammoth, the two groups being under the same management, and belonging to New England people. The Bald Mountain veins have a strike from northeast to southwest, in a slate formation. They vary in width considerably, but are said to average 40 feet wide between the walls. The ore shoots, within the ledge, carry free gold in a quartz, talc and porphyry, with iron sulphides carrying gold. It is stated that 40% of the gold in this ore is susceptible to amalgamation. The sulphides carry 3½% iron, 80% silica, a small per cent each of copper, cinnabar and silver. The mine is opened through a main tunnel which goes in 640 feet on the vein, from which a crosscut runs 370 feet to a second ledge; also by a shaft that sinks 200 feet on the vein near the tunnel entrance. From the shaft three levels are run on the vein, each about 700 feet long. All this work proceeds southwesterly along the ore ledges, there being some stopping above each level.

The mill is situated 2300 feet east of the shaft house and at a point 780 feet lower. A three-rail gravity tram line, built on an incline, conveys the ore from the mine to the mill. The latter is equipped with crusher, twenty stamps with plates, twelve Johnson concentrators. The mill is run by water power, the source of water supply being a small lake 703 feet above the mill. A flume 3 miles long and 2000 feet of pipe line conveys the water to the water wheels at the mill, by which 1.71 H. P. is developed with each miner's inch of water. A 4-foot Pelton wheel takes water pressure from a ½-inch nozzle; there are also other water motors of smaller size which run different parts of the mill. Manager McCallum states that their power costs 15 cents per day. The plan is to put in a cyanide plant to leach the concentrates. It is further planned to drive a tunnel on a level with the crusher floor of the mill which will cut the first ledge 1400 feet from entrance and at vertical depth of 900 feet; the other parallel ledges are expected to be reached 600 to 900 feet farther in. This deep tunnel will cut the veins 500 to 700 feet below the water level and drain the property. An air compressor will soon be installed to do this work with air drills. The Bald Mountain group is near the head of McCulloch's fork, 7 miles southwest from Sumpter.

The Annu Lulu group, between the Mammoth and Bald Mountain, is being developed by Mr. Trimble and associates. They have done some work on the contract between slate and porphyry.

A. W. Anderson and G. L. Rutherford are developing the Tammany group, which sidelines with that of the North Pole. They have done 500 feet of work on the Deer Lodge ledge, which runs north and south.

A number of locations on the east side of Cracker creek are attracting some attention. Among them are the Minneapolis, May Belle and Little Cracker. The first named is said to have been sold for \$12,000 to Seattle parties.

In Cable Cove, which is a basin near the crest of the range that separates the John Day streams from the Powder river system, is much activity in the way of development and some production. The California, Baby McKee and others form the centers of activity. The Germania group of eight claims, belonging to Geo. M. Diehms, 3000 feet from the California, is being developed some. In this locality the country rock comprises granite and serpentine, the ores being a copper and iron sulphide, with copper and gold values.

On the opposite side of the range, west from Cable Cove, the Constellation group of ten claims is being developed by Reed, Barstorf and others, the present work showing fair values in gold, silver and copper in a sulphide ore. The Gypsy Queen is the name of another group 1500 feet from the Constellation.

Bourne, Or., June 18. WASCOTT.

JACKSON COUNTY.

R. L. Cooper, of Crescent City, Cal., one of the owners of the Blue Ledge Co.'s mine on Joe creek, says in regard to the mine that the tunnel is in about 168 feet, and they have 300 tons of ore on the dump.

JOSEPHINE COUNTY.

J. S. Howard has completed the survey of the proposed ditch of the Ray M., I. & P. Co., at Gold Hill. The ditch will take water from Rogue river, 3 miles above Gold Hill, and carry it to an elevation of 58 feet above that stream at Gold Hill. With this fall it is intended to raise some

of the water 75 feet higher to make it available for working placer ground. It is proposed to operate an electric plant and develop 4300 H. P. Dr. Ray will be superintendent.

The Old Channel M. Co., Gold Hill, has sold its property to J. R. Harvey and C. B. Beardsley, who have been operating it under a bond for about a year. The sale price is stated to be \$90,000.

Stewart & Banfield, of Grants Pass, have discovered and are opening up near Althouse a quartz vein of great richness. From a shaft 20 feet down on the ledge they have mortared out from \$25 to \$100 per day in coarse gold.

H. Leuthy, at Althouse, has sunk a shaft and has a 1-stamp mill grinding out from \$30 to \$100 daily. A recent cleanup was \$2300.

A new ledge, rich in free gold, has been discovered at Placer, and is being developed by Browning & Son, who operate a 3-stamp mill in Placer connected with the Yellow Horn mine.

The equipment for the Rising Star mine in the Applegate district, near Grants Pass, consisting of five stamps to be added to the battery of ten already in operation, air drills, pumps, concentrators, engines and additional boilers, is being installed.

WALLOWA COUNTY.

The Hibbs group of gold-copper claims on Innaha has been sold to a Fargo, N. D., company for, it is reported, \$15,000, \$2500 down. The sale was made by M. Hibbs and E. H. Parton of Joseph.

TEXAS.

STONEWALL COUNTY.

E. B. Evans, Dr. D. H. Tucker of St. Louis and L. Jobe of Clebourne, Texas, have secured copper lands in this county, ore from which has been assayed and runs high in copper.

UTAH.

BOX ELDER COUNTY.

The Susannah G. M. Co. has been incorporated, capital \$150,000; J. T. White is president, E. B. Critchlow secretary and J. B. Toronto treasurer, with office at Salt Lake City. The company owns the Susannah, the Susannah Annex and the Helen mining claims.

The Planet G. M. & M. Co. has been incorporated to develop the Alice and thirteen other claims in Park valley; capital, \$50,000. J. T. White is president and J. B. Toronto secretary and treasurer, with office at Salt Lake City.

JUAB COUNTY.

The titles to the Uncle Sam, on Godiva mountain, at Tintic, having been approved, \$250,000, the balance due, has been paid to J. Knight. From the abstract it appears that for the Uncle Sam proper Mr. Knight paid less than \$30,000. It has yielded him over \$800,000.

SAN JUAN COUNTY.

The International M. Co. has arranged for the development of its properties near Castleton, in the La Sal country. D. Ferguson will be manager.

Mine operators in the La Sal basin have united in a project for the construction of a smelter near Cisco. The stock will be subscribed by the mine owners and the company will issue bonds at par, accompanied by stock bonuses. S. A. McLean is in Chicago to secure the necessary money for the building of the plant. In connection with the smelter an electric road will be built from Miners' basin to the smelter.

SUMMIT COUNTY.

At a meeting of the Park City & Mid-night Sun M. Co., D. A. Gillis was elected president, superintendent and general manager, and W. P. Mortenson secretary and treasurer, with office at Park City. It was decided to run the lower tunnel in 100 feet more, with the expectation of cutting the first ledge within this distance.

It is reported that the Daly mine is to be reopened under J. Quinn, the former foreman. It is said that for the present it is to be worked through the Ontario.

TOOELE COUNTY.

It is stated that Senator Clark of Montana has decided to build a furnace to reduce the concentrates of his Ophir mine to a matte. At present they are hauled from the mines in Ophir canyon to Stockton, and then shipped by railroad to a custom smelter, so that the possible earnings are seriously reduced.

WASHINGTON.

OKANOGAN COUNTY.

(Special Correspondence).—The American Flag mine is in the Methow district, 40 miles northwest from Ives landing on the Columbia. The mine is opened up by about 2500 feet of tunnel and drift work. A stamp mill, with plates and concentrators, is being completed, which is expected to begin operating by August.

The Slate Creek district is reached by

the Methow road, and is on the west slope of the Cascade range. In that locality the Eureka, belonging to Chas. Lane, is operating a 10-stamp mill and ten additional stamps have been ordered. The Mammoth, which is operating a 5-stamp mill, has ordered equipment for twenty more stamps. The ores of the Methow and Slate creek districts are free-milling gold quartz, to a large extent, with perhaps the necessity for cyanide work on the plate tailings.

Loomis, July 5.

FERRY COUNTY.

The ore body has been reached in the lower tunnel of the Malachite. A contract has been let to haul ore to Wilbur. The Lorraine C. M. Co., composed of Grays Harbor people, are the owners. F. J. Chamberlain is manager.

The Republic mine was closed down on the 29th ult. The mill is closed. No announcement is made as to the cause.

SPOKANE COUNTY.

The Metador M. & M. Co., capital \$5000, has been incorporated by W. F. Boettcher, G. S. Armstrong, J. W. Gilson and W. H. Bell of Spokane, M. Jacobs, Kendrick, Idaho, and J. A. Ghent, Wallace, Idaho.

STEVENS COUNTY.

A ledge of copper-gold ore has been found on the farm of M. C. Peltier at Fruitland by A. King, who has a shaft down 52 feet and a tunnel in 145 feet. Assays show from \$3 to \$30 in gold and \$4 to \$35 in copper.

WYOMING.

FREMONT COUNTY.

Ore taken from the copper strike recently made in the Lost Cabin mountains, 20 miles south of Thermopolis, shows over 50% copper, and development work is to be begun immediately by M. C. McGrath, who will have a 150-foot shaft sunk.

FOREIGN.

BOLIVIA.

J. M. Burnell, formerly of Denver, recently returned from Bolivia, says of the Gold Exploration Co. of Colorado and Bolivia, of which he is manager, that the company owns placer claims on the Tipuani river, in Bolivia, in which locality there are several other mining companies. In the same district is the property of the Bolivia G. M. Co., managed by C. Lincoln, formerly of Denver. His company's holdings on the Tipuani, he states, are about 1000 miles from the coast, reached by rough mountain trails, over which it is almost impossible to transport machinery. The country is very rich and the mining laws favorable. Americans and Europeans are beginning to come in. The Europeans are merchants and the Americans are miners. Mr. Burnell will return to Bolivia to push the development of the company's property, installing a hydraulic elevator on his return.

BRITISH COLUMBIA.

The Granite mill, at Nelson, which has been running for some time past on the Poorman ore, has been shut down.

At the annual meeting of the North Star M. Co., at Montreal, it was decided, owing to the low price for lead and excessive charges for smelting and transportation, to curtail shipments from the mine at Nelson. F. Robbins, manager, stated that the shipments had already been curtailed from nearly 2000 tons a month to 1000 tons, which the company is under contract to ship monthly to the Trail, Nelson and Everett smelters.

Ehrenseller & Beer, representing the Antwerp Smelting & Refining Co. of Antwerp, Belgium, have been in Kaslo to make arrangements to handle the silver-lead ores of Slocan.

The Kaslo Smelter Co., Ltd., is having E. D. Wilson of the Standard Smelting Co. of Montreal investigate the smelting situation at Kaslo.

Gold to the amount of \$3200 is the product of three weeks' washing at the Wreck Bay beach sand mines on the west coast of Vancouver island.

The London and the Richelieu mines will soon be ready to ship sixty tons of ore daily over the new tramway. T. G. Roy, manager, says it is the intention to erect a mill this summer.

Work is to be resumed on the Leviathan group on the Kootenay lake.

At the Hayes property, at Alberni, Vancouver island, wharves, air compressors, reduction works and an aerial tramway are to be built, and, it is understood, in a very short time a smelter on Alberni canal.—J. T. Hunter of San Francisco has bought the Thistle group of claims at Alberni for \$15,000. Development will be made at once and machinery will be shipped in immediately.—On the Golden Eagle a road is being built from Mineral Hill to the mine and 100 tons of machinery taken in. It is understood that a concentrator and an aerial tramway will

be built, the terminus of the latter on the canal to be at China creek. Mr. Newton, the owner, has also called for bids for a wharf at China creek.

W. Callander of Canmore says he has made a find of a mica ledge 30 feet in thickness. He intends to bring several cargoes to Beaver by boat this summer.

W. Alpersen, M. E., president of the Richmond M. Co., has bonded of Ellis Bros. & Critchley for \$50,000 the Morning Glory group, a copper property on Copper creek, the Monarch group, with galena and gray copper showing, on the north fork of Toby creek, and the Silver Pass, a galena and copper group adjoining the Red Line and the Iron Cap, which are being operated by the Fraser & Chalmers Co. of Chicago. Preparations are being made for development work.

Work will be resumed on the Wilcox mine, near Ymir, owned by the Broken Hill M. & D. Co.

The B. C. G. Co. of London is developing a group of eighteen claims in Nicola district. The ore is rich in copper.

G. B. McAulay, managing director of the Cariboo mine, has arranged for forty additional stamps for the mill. It is understood that Mr. McAulay will lay out plans for sinking a new four-compartment shaft and will let a contract for a new hoist with a sinking capacity of 1500 feet.

The Mountain Iron property at Kaslo is to be opened by H. C. Reihle for a London syndicate. He has had extensive experience with the same ore in Belgium.

The Payne ore is going to the Noble Five mill for a 1000 ton concentrating test on the ore from the dump.

The Emily Edith group at Silverton is being worked by an English syndicate. The mine at the present time is developed sufficiently to warrant the erection of a concentrator, but the low price of lead is compelling the company to seriously consider closing down until the market is more favorable. Charles E. Hope of Vancouver is manager.

W. H. Hocking and W. Hocking have arranged in Ashcroft for work on the Maggie mine, 18 miles north of Ashcroft. Smith & Bryson of Ashcroft are also interested. Assays of 18% copper have been obtained from some parts of the ledge.

W. H. Brandon of Toronto is to work the Canadian group at Kaslo.

MEXICO.

The Paramide M. Co., of Riverside and Los Angeles, Cal., people, owning a concession of placer mining ground in Lower California, has voted to accept the offer of an outside party to put the necessary machinery on the mine to work it, he to get a share of the mine. The officers elected were: D. G. Mitchell of Riverside, president, and F. Kingman of Riverside, secretary. The company did considerable work on its mine a couple of years ago, but was not very successful. The party who now proposes to put in a plant to do the work will expend \$35,000.

Commercial Paragraphs.

THE Electric Railway and Manufacturers' Supply Co., of San Francisco, has moved its office and warerooms to the large brick building, Nos. 68 and 72 First street, near the corner of Mission.

H. M. SWETLAND has shipped to Arizona a machine for handling placer gravel. It has a capacity of 1000 cubic yards a day, and requires a water supply of only 300 gallons per minute. It was designed by and built under the supervision of Frederick T. Snyder & Co., mining plant construction engineers, Chicago.

BAKER & Co., metallurgists in platinum of Newark, N. J., are presenting to their customers a useful advertising novelty in the form of a dating stamp. The memorandum book, containing notes on the use and care of platinum ware, and an assortment of useful tables, was highly appreciated by their friends, and they believe that the dating stamp will meet with an equally cordial reception.

THE Denver office of the Allis-Chalmers Company have closed the contract with the Telluride Reduction Company to furnish all the machinery for the new bromine plant to be erected in Colorado to handle Cripple Creek ores. This will be an independent mill of large capacity, with ample capital. Mr. C. D. Grove, the chief engineer and metallurgist, is now at the Allis works in Milwaukee, where the plans are being prepared.

THE Calumet & Hecla Mining Co. have ordered from the Mine & Smelter Supply Company, of Denver, Colo., ten latest improved Wilfley concentrating tables for each of their six steam stamps in their new mills, a total of sixty tables. The Wilfley table was adopted after tests extending over several months in which many modern concentrating tables were thoroughly tested. The makers of the Wilfley table claim that the Wilfley table is the best table now in the market.

Personal.

CHARLES BUTTERS of Salt Lake City, Utah, is in London.

RICHARD A. PARKER of Boston, Mass., is in Salt Lake City, Utah.

F. P. DUNN has resigned as manager Balliet properties, at Baker City, Or.

E. J. TREBRISE has been appointed manager Madisonian mine, Sheridan, Mont.

F. A. GOURLEY of Nevada county, Cal., has recently returned there from Siberia.

ARTHUR WILLSON has been appointed manager De Beers Con. M. Co., Rhodesia, S. A.

F. O. WILKINSON of Sandy, Lincoln county, Nev., is sojourning in Los Angeles, Cal.

G. E. WARD, M. E., of Seattle, Wash., is examining mines near Wickenburg, Ariz.

J. MCK. ANDERSON, manager Gold Hill Ex. Co. of Toronto, Canada, is in the Lardreau, B. C.

E. P. MITCHENER of Stockton, Utah, has returned to that place from a trip to New York.

C. P. COLLIER, Supt. Octave G. M. Co. in Yavapai county, Ariz., has returned from Peru.

PROF. J. S. DILLER of the U. S. Geological Survey, is at Crater Lake, in southern Oregon.

S. A. GILCHRIST has been appointed Supt. Clio mine, Jacksonville, Tuolumne county, Cal.

MR. CARROLL of the Risdon Iron Works has returned to San Francisco after an absence of about two years.

C. W. AYERS, Supt. Grand View gravel mine, at Montezuma, Tuolumne county, Cal., is in Alaska.

A. T. JUDSON, M. E., of Los Angeles, Cal., is in Ketchikan district, southeastern Alaska, examining mines.

J. L. GLUYAS is in charge of the underground work at the California mine, Gaston, Nevada county, Cal.

R. S. ENSLOW, Pres. Jamestown, Cal., M. & M. Co., will return from an Eastern sojourn about the 16th inst.

E. P. PORTER of the U. S. Geological Survey is in Republic, Wash., examining the geology and mines of that district.

IRA A. PEASE, Supt. Amco hydraulic mine, Oroville, Cal., has been appointed Supt. Old Glory mine, at the same place.

CHARLES CHAMBERLAIN of Spokane, Wash., is at Dolomi, Prince of Wales Island, Alaska, examining gold mines there.

J. M. BURNELL, manager Gold Ex. Co. of Colorado and Bolivia, has returned from the latter country to Denver, Colo., for a short visit.

THEO. F. VAN WAGENEN of Colorado has assumed the general management of the properties of the Nevada Copper Co., near Lovelock, Nev.

MR. E. I. PARSONS succeeds Percy H. Stuart as general manager California Wire Works. The establishment now occupies new and enlarged quarters, 17-19 Fremont St., San Francisco.

Recently Declared Mining Dividends.

	Payable.
Mary McKinney G. M. Co., Colorado, quarterly 3 cents per share and 3 cents extra, \$60,000.....	July 10
Parrot M. Co., Montana, quarterly \$1.50 per share.....	July 29
Adventure M. Co., Michigan, \$3 per share.....	July 15
Swansea M. Co., Utah, monthly 5 cents per share, \$5000.....	July 10
Silver King M. Co., Utah, monthly 6 1/2 cents per share, \$100,000.....	July 10
La Fortuna C. M. Co., Arizona, monthly 5 cents per share, \$12,500.....	July 9
Dalton & Lark M. Co., Utah, 10 1/2 cents per share, \$256,725.....	July 10
Bald Butte M. Co., Montana, monthly 6 cents per share, \$15,000.....	July 10
Rocco-Homestake G. M. Co., Colorado, monthly 1 1/2 cents per share, \$4500.....	July 10
Mammoth M. Co., Utah, monthly 5 cents per share, \$20,000.....	July 12

Books Received.

"A. B. C. of the Telephone," 12mo., pp. 332, by James E. Homans, A. M. A practical explanation, with diagrams and illustrations, of an important mechanical device in every-day use. It will be a valuable aid in installing and maintaining telephone plants which do not have the services of experts. Published by Theo. Andel & Co., 63 Fifth Ave., New York City; \$1 postpaid.

Latest Market Reports.

SAN FRANCISCO, July 11, 1901.

SILVER.—Per oz., Troy: London, 26 1/2d (standard ounce, 925 fine); New York, bar silver, 58 1/2c (1000 fine); San Francisco, 58 1/2c; Mexican dollars, nominal San Francisco, 46 1/2c New York.

COPPER.—New York: Lake, 1 to 3 casks, \$17.25; carload lots, \$17.00; Electrolytic, 1 to 3 casks, \$16.75; carload lots, \$16.62 1/2; Casting, 1 to 3 casks, \$16.60; carload lots, 16.50. San Francisco: 18. Mill copper plates, 20c; bars, 22@23c. London: \$67 per ton.

LEAD.—New York, \$4.37 1/2; Salt Lake City, \$4.00; St. Louis, \$4.32 1/2; San Francisco \$4.90, carload lots, 5 1/2c 1000 to 4000 lbs.; pipe 6, sheet 6 1/2, bar 5 1/2c; pig, \$5.25. London, £12 5s per ton—2.64 cents per lb. SPelter.—New York, \$4.20; St. Louis, \$3.75; London, £16 2s 6d per ton —3.58 1/2 cts. per lb; San Francisco, ton lots, 5 1/2c; 100-lb lots, 6c.

ANTIMONY.—New York, Cookson's, 10c; Hallett's, 9c; San Francisco, 1000-lb. lots, 10c; 300 to 500 lbs., 11c; 100-lb. lots, 13@15c.

IRON.—Pittsburg, Bessemer pig, \$15.25; gray forge, \$14.25; San Francisco, bar, per lb., 2.65c in small quantities.

STEEL.—Bessemer billets, Pittsburg, \$25; open hearth billets, \$27.00; San Francisco, bar, 7c to 12c per lb.

TIN.—New York, pig, \$26.00; San Francisco, ton lots, 30c; 1000 lbs., 30 1/2c; 500 lbs., 30 1/2c; less, 31c; bar tin, \$3, 35c.

QUICKSILVER.—New York, \$51.00 large lots; London, £9 2s 6d; San Francisco, local, \$48.00 flask of 76 1/2 lbs.; Export, \$45.00.

MAGNESIUM.—New York, \$2.90 3/4 lb.; San Francisco, \$3.75.

ZINC.—San Francisco, 5 1/2c; slab, 5 1/2c; bar, 7c; zinc dust, N. Y., 8c.

BABBITT METAL.—San Francisco, No. 1, 10c.

SOLDER.—Half-and-half, 100-lb. lots, 19c; San Francisco, Plumbers', 100-lb. lots, 15 1/2c.

PHOSPHORUS.—F. o. b. New York 50@60c 3/4 lb.

ASSAY LITHARGE.—San Francisco, 10c 3/4 lb. small lots.

BISMUTH.—New York, \$3 lb., \$2.25 50-lb lots; San Francisco, \$2.50 to \$2.75 lb lots.

PLATINUM.—San Francisco, crude, \$22 3/4 oz.; New York, \$22 per Troy oz.

FERRO-MANGANESE.—Pittsburg, 80% domestic, \$58.50, large lots.

TUNGSTEN.—New York, \$3 lb., 95c; San Francisco, \$1.15.

FERRO-TUNGSTEN.—New York, 37%, 32c; San Francisco, 65c (60%).

NICKEL.—New York, 50@60c 3/4 lb.

ALUMINUM.—New York, No. 1, 99% pure ingots, 35c; No. 2, 90%, 30c to 35c.

POWDER.—F. o. b. San Francisco: No. 1, 70% nitro-glycerine, per lb., in carload lots, 15 1/2c; less than one ton, 17 1/2c. No. 1*, 60%, carload lots, 13 1/2c; less than one ton, 15 1/2c. No. 1** 50%, carload lots, 11 1/2c; less than one ton, 13 1/2c. No. 2, 40%, carload lots, 10c; less than one ton, 12c. No. 2* 35%, carload lots, 9 1/2c; less than one ton, 11 1/2c. No. 2** 30% carload lots, 9c; less than one ton, 11c. Black blasting powder in carload lots, minimum car 728 kegs, \$1.50 per keg; less car lots, \$2 per keg.

CAPS.—3x, \$5.50 per 1000; 4x, \$6.50; 5x, \$8; Lion, \$9, in lots not less than 1000.

FUSE.—Triple tape, \$3.60 per 1000 feet; double tape, \$3.00; single tape, \$2.65; Hemp, \$2.10; Cement No. 2, \$3.00; Cement No. 1, \$2.65, in lots of 3000 feet and up.

CANDLES.—Granite 6s, 16 oz., 40s., 10 1/2c 3/4 set; 14 oz., 40s., 9 1/2c.

OILS.—Linseed, pure, boiled, bbl., 75c; cs., 80c; raw, bbl., 73c; cs., 78c. Deodorized Stove Gasoline, bulk, 14 1/2c; do., cs., 20 1/2c; 86° Gasoline, bulk, 20c; do., cs., 26c; 65° Naphtha or Benzine, deodorized, in bulk, per gal., 13 1/2c; do., in cs., 19 1/2c; Lard Oil, Extra Winter Strained, bbl., 75c; cs., 80c; No. 1 bbl., 50c; cs., 55c. Neatsfoot Oil, cooper's' bbls., 60c; cs., 65c; No. 1 bbl., 50@52 1/2c; cs., 55@57 1/2c.

CHEMICALS.—Cyanide of potassium, 98%-99%, jobbing, 32 1/2@33 1/2c 3/4 lb.; carloads, 30@31c; in 10-lb. tins, 40c; sulphuric acid, in carboys, 66% B, 2c 3/4 lb.; soda ash, \$1.90 3/4 lb.; hyposulphite of soda, 2 1/2@3c 3/4 lb.; blue vitriol, 5 1/2@6 1/2c 3/4 lb.; borax, concentrated, 7@8c 3/4 lb.; chloride of potash, 12@13c; roll sulphur, 6c; alum, \$1.90@2.00; flour sulphur, French, 2 1/2@2 1/2c; California refined, 1 1/2@2c; nitric acid, in carboys, 8c 3/4 lb.; caustic soda, in drums, 3@4c 3/4 lb.; Cal. s. soda, bbls., \$1.00; sks, 95c 3/4 100 lbs.; chloride of lime, spot, \$2.50@2.60; nitrate of potash, in kegs, 8c; caustic potash, 10c in 40-lb. tins.

COAL.—San Francisco, coast, yard prices: Wellington, \$9; Seattle, \$7.00; Coos Bay, \$5.50; Southfield, \$9.00. Cargo lots, Eastern and foreign: Wallsend, \$8.00; Brymbo, \$7.50; Pennsylvania, hd., \$14.00; Scotch, \$3; Cumberland, \$12; Cannel, \$9.50; Welsh Anthracite, \$12.00; Rock Springs, \$8.50; Colorado Anthracite, \$14.50. Coke, \$16 per ton in bulk; \$18 in sacks.

New Patents.

DEWEY, STRONG & CO.'S SCIENTIFIC PRESS PATENT AGENCY, 330 Market St., S. F., has official reports of the following U. S. patents issued to Pacific coast inventors:

FOR WEEK ENDING JULY 2, 1901.

677,532—CAR FENDER—S. W. Alexander, Los Angeles, Cal.
677,533—PULLEY—D. B. Baker, Tacoma, Cal.
677,534—VINEYARD PLOW—J. A. Bilz, Pleasanton, Cal.
677,535—SAW GAUGE—C. F. Fowler, Columbia City, Ind.
677,536—EXCAVATOR—J. C. des Granges, S. F.
677,537—BOILER LEVELING DEVICE—Grisez & Walsh, Montague, Cal.
677,538—ROASTING FURNACE—B. Hall, Nevada, Cal.
677,539—WINDOW—E. Hipolito, Los Angeles, Cal.
677,540—RAILWAY—G. Larson, Hotell, Wash.
677,541—BRISTLE—H. O. Laussen, Newman, Cal.
677,542—STOP MECHANISM FOR MACHINES—F. T. Lottich, S. F.
677,543—PIPE BOILER—W. MacFarlane, Seattle, Wash.
677,544—WEIGHING MACHINE—J. Mader, S. F.
677,545—STAMP MILL FEEDER—A. C. Pratt, S. F.
677,546—MOSAIC PANELS—W. J. Blackwood, Monrovia, Cal.
677,547—ELECTRIC CUT OUT—F. H. Rogers, San Jacinto, Cal.
677,548—BICYCLE BRAKE—J. Schulte, Jr., Monterey, Cal.
677,549—TELEPHONE SWITCH—W. D. Watkins, San Jose
677,550—ANCHOR—J. N. Young, Alameda, Cal.
677,551—DESIGN—O. H. Greene, Red Bluff, Cal.

Notices of Recent Patents.

Among the patents recently obtained through Dewey, Strong & Co.'s SCIENTIFIC PRESS U. S. and Foreign Patent Agency, the following are worthy of special mention:

DISK HARROW.—No. 677,140. June 25, 1901. O. T. Owens, Altamont, Cal., one-half assigned to J. E. Allison. This invention comprises a series of turnable disks, disk-shaped cutters journaled to revolve approximately in front of the first-named disks, and to enter the ground so as to resist the side thrust of the latter disks, means for supporting the first-named disks and permitting them to be turned and held at an angle with relation to the cutters.

FARM TRUCK.—No. 676,972. June 25, 1901. J. A. Ashley, Yuba City, Cal. This invention relates to vehicles of the class used in gathering fruit in orchards and vineyards, or where movement or turning in a limited space is necessary, with small size, lightness, strength and rigidity, and ease of riding to prevent damage to the fruit in transportation over rough ground. The truck is formed with an arch at the front of the body, connecting it with the front axle, the forward end of the arch having an abutment directly over and upon the axle where the rear end of the body is

supported upon springs secured to the rear axle. Stirrups are employed, which the axle has a free, vertical, sliding movement, and means by which the stirrups are relieved from strains caused by the draft of the apparatus.

PORTABLE FORCE.—No. 677,148. June 25, 1901. Wm. C. Thurman, Santer, Cal. This force includes a hearth having a transverse fire-pit extending completely across and open at the ends, a main air passage, passages branching from said main passage and having tuyeres entering the pit, and a controlling device substantially at the junction of the branch passages with the main air passage to regulate the blast in the branch passages.

VINEYARD PLOWS.—No. 677,495. July 2, 1901. J. A. Bilz, Pleasanton, Cal. The object of this invention is to provide gang plows, which are designed to work between regularly spaced rows of vines or trees, and it consists in a novel construction and arrangement of plow frames, standard and adjusting sockets, journal-boxes of the wheel axles and adjusting lever mechanism whereby the location of these parts may all be shifted or reversed in a single apparatus, and the plows may be first used to throw the earth away from the rows, and afterwards adjusted for a second plowing to throw the dirt towards the rows.

NOTICE.

THE JAMESTOWN MINING AND MILLING COMPANY has to announce to the public that they are now open for its inspection. Their property consists of three full mining claims in the very heart of the great gold district of Tuolumne County. Among their property is the well known "BADGER" mine, which is adjacent to the famous "ROYAL," for which an offer of \$1,500,000 was recently refused. The ore of the Badger mine is ribbon quartz having an average of \$15 in free gold and carrying about one and one-half per cent of sulphurets assaying from \$250 to \$300 per ton. With improved machinery, the cost of mining and milling will not exceed \$3.25 per ton. Now, in view of the fact that the JAMESTOWN M. & M. CO. realize that, in order to make their mines productive and paying properties, they must equip and prepare the mines for the extraction of ore, they will place 25,000 shares of their treasury stock, which is 100,000 shares, on the market at the very low price of 50 cents per share; which will place the mine on a first-class paying basis, in view of the developments already done on the mine. And they are confident that the last 50,000 shares will have a value of \$2.50 per share. To those contemplating an investment in a first-class prospecting and one that cannot afford to be overlooked, as it will bear the closest investigation. PROSPECTUS and the fullest information can be had at the Company's office, Room 21, No. 40 Montgomery St., San Francisco.

J. W. BYRD, Secretary.

MINERS' AND PROSPECTORS' GUIDE.

REVISED THIRD EDITION.

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Price 25 Cents.

SITUATIONS WANTED.

A first-class machinist, engineer and cyanide man wants situation. Ten years' experience in cyanide plant; three years foreman; three years superintendent. All references. Box 31, this office.

MINING ENGINEER.—Position wanted by a middle-aged man of family. Complete technical knowledge. Experience in surveying, draughting, assaying, and qualitative analysis. Own instruments. Nominal salary. References. C. J. O'Brien, 455 Eddy St., San Francisco, Cal.

WANTED.—Position as superintendent of mine or mill by a technical graduate, not in charge of a 21-stamp mill and cyanide plant. Am a good assayer and mine surveyor, also a U. S. Deputy Mineral Surveyor. Add care E. M., care Mining and Scientific Press.

Wanted, a position as superintendent of quartz mine. Have had years of experience. Can do anything about a mine or mill. Know the value of a dollar in labor or material, with common sense to back me. No objections to go to South Africa, Corea or Mexico. Can give references. Address B. X. 30, this office.

Superintendent of a large silver-lead mine for the last five years wishes to change position. Has worked in Montana, Idaho and Canada for 22 years as miner, foreman, superintendent and manager. Thoroughly competent assayer and surveyor and competent to handle men. Care B. C. A. Mining and Scientific Press.

A sober, industrious, young man, who is a competent surveyor, assayer, draughtsman and book-keeper de-lies a situation. Understands the preparation of maps thoroughly. Good references; salary reasonable until salaries are demonstrated; practically trained; three years' practical experience. "M." care of this office.

PRACTICAL SMELTERMAN,

who had experience with sulphide and carbonate copper and lead ores in California and Mexico, is competent to design or take charge of smelter, wants responsible position as chemist, furnace boss or superintendent. Address "Metallurgist," care Mining and Scientific Press.

WE BUY very rich Ores, Dental Scraps, Tellurium Ores, Mill Wastes, Jewelers' Sweeps, Gold Retorts, Old Iron Retorts, Base Amalgam, Quicksilver, Amalgamated Plates, Gold and Silver, Old Slags.

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SPECIAL NOTICE.—Capitalists and wealthy syndicates desiring to purchase large operating gold and copper mines at owners' bedrock prices, can most likely find what they want by corresponding directly with the undersigned. By doing so, buyer and seller can be brought together without the intervention of useless and undesirable promoters, brokers and middlemen. We have several very desirable properties now for sale. B. J. FRASER, 622-623 Parrott Bldg., San Francisco, Cal.

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We are very much pleased with the filter purchased from you some time ago. It gives us perfect satisfaction, and gives in return a better looking oil than we buy.

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Shall we send one on approval? You can return it at our expense if not satisfactory.

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Mines and prospects in British Columbia and the Northwestern States.
Free-milling Gold properties on very reasonable terms.
Excellent chance for profitable investment in legitimate mining.
Correspondence solicited.
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FOR SALE OR FOR LEASE.
Placer mine, 1/2 of a mile of valuable river bottom on Calaveras river, Calaveras Co., Cal. Machinery complete. New four-room house, stables, etc. For further particulars, apply to P. KOPPEN, No. 333 Front St., San Francisco, Cal.

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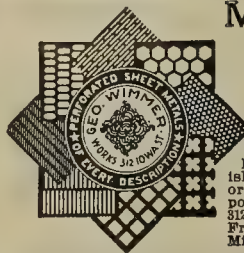


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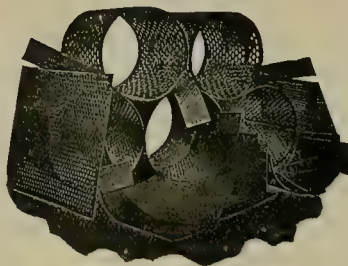
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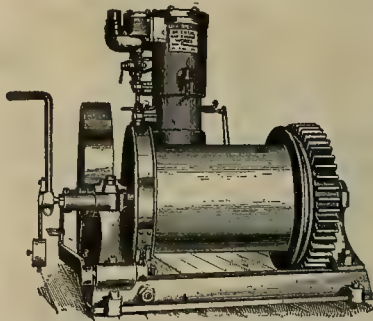
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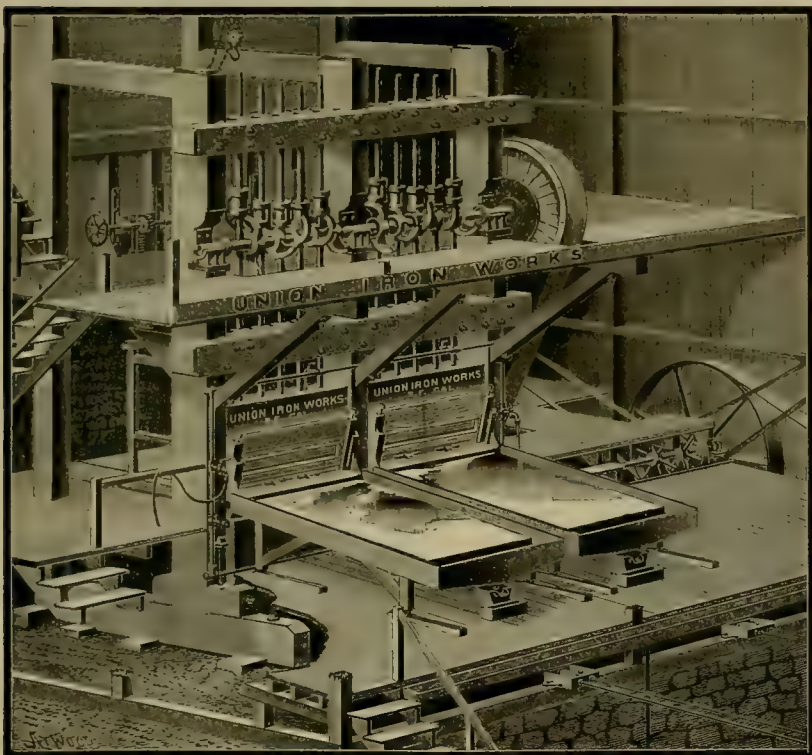
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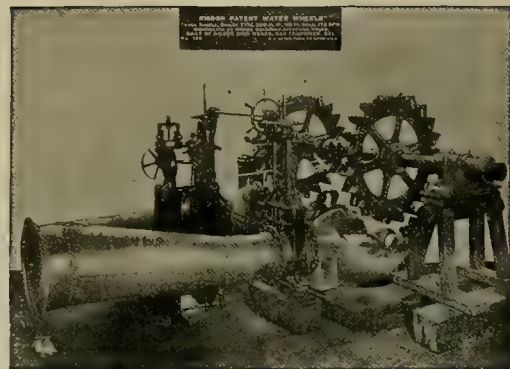
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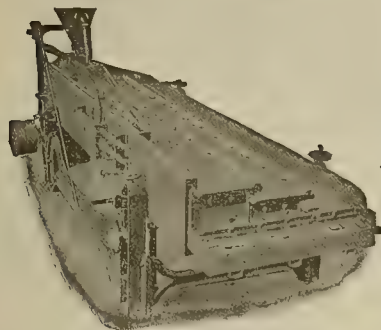
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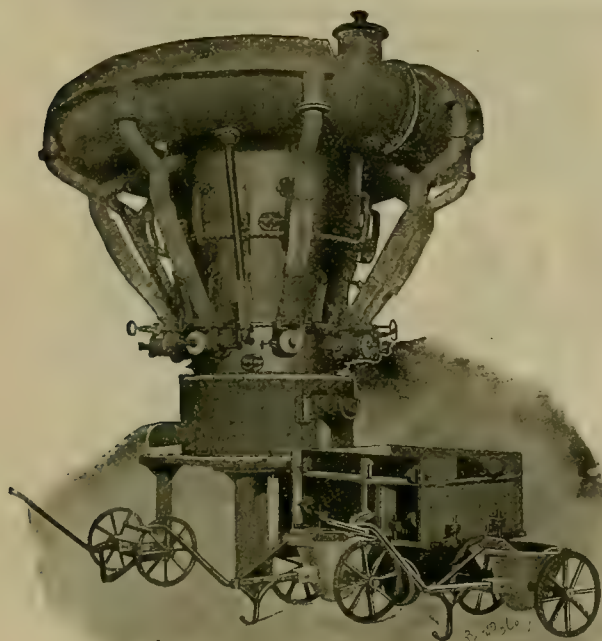
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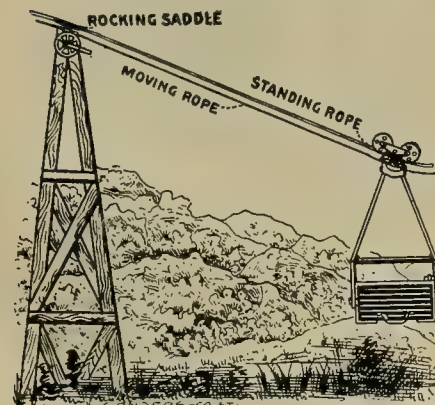
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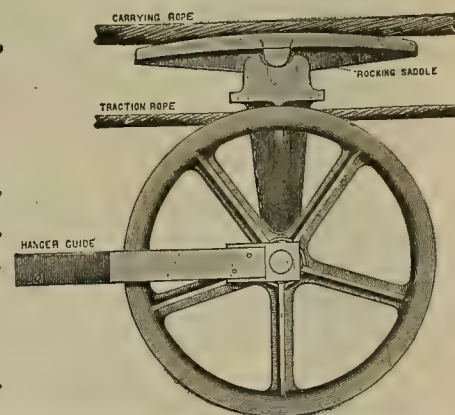
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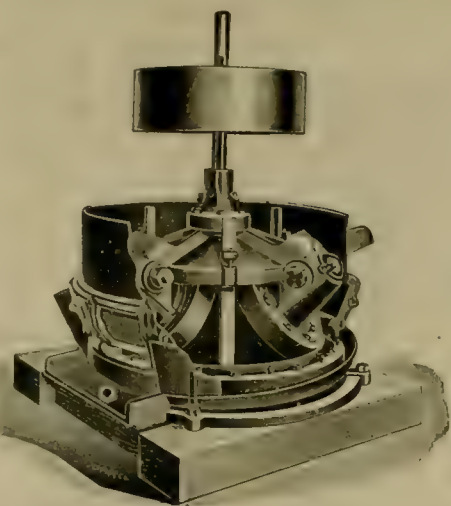
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The Griffin Three Roller Ore Mill is a simply constructed Mill, suitable for working all kinds of ores that require uniformly fine crushing by the wet process. This Mill is a modification of the well-known Chilian Mill, but the rollers run upon a crushing ring or die, which is inclined inwardly at an angle of about 30 degrees, the rollers themselves also being inclined to the central shaft of the Mill, thus utilizing the centrifugal force, as well as the weight of the rollers themselves as a crushing agent. The Griffin Three Roller Ore Mill is therefore a Mill of great strength, and has few wearing parts. We construct these Mills with extreme care, using only the best of raw materials, which are most carefully worked by men who are specialists as mill builders. We sell the Griffin Ore Mill on its determined merits, and will gladly supply full information regarding it to any one.

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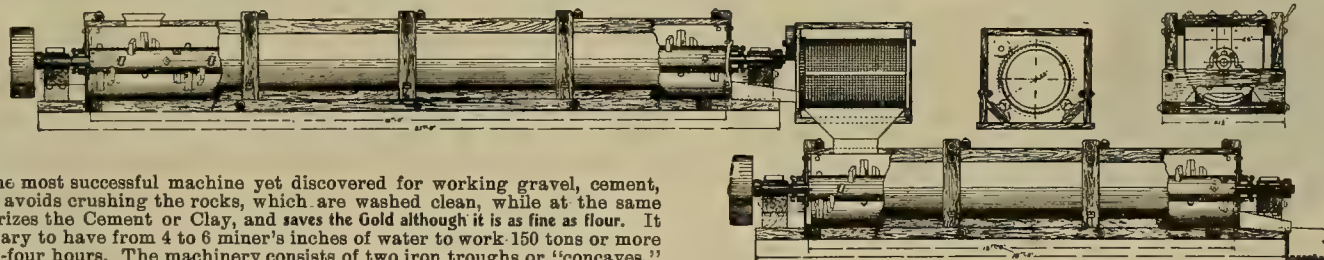
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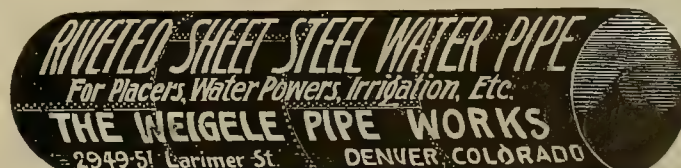
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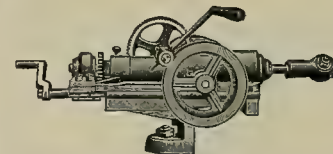
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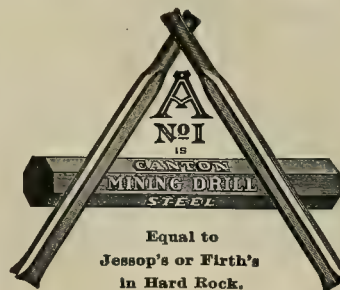


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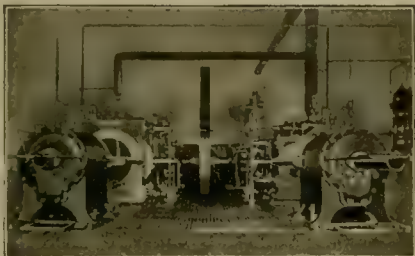
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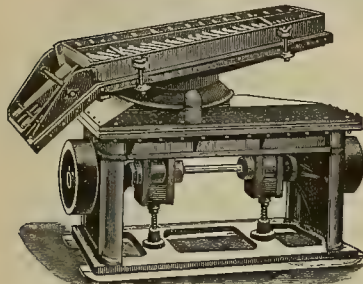
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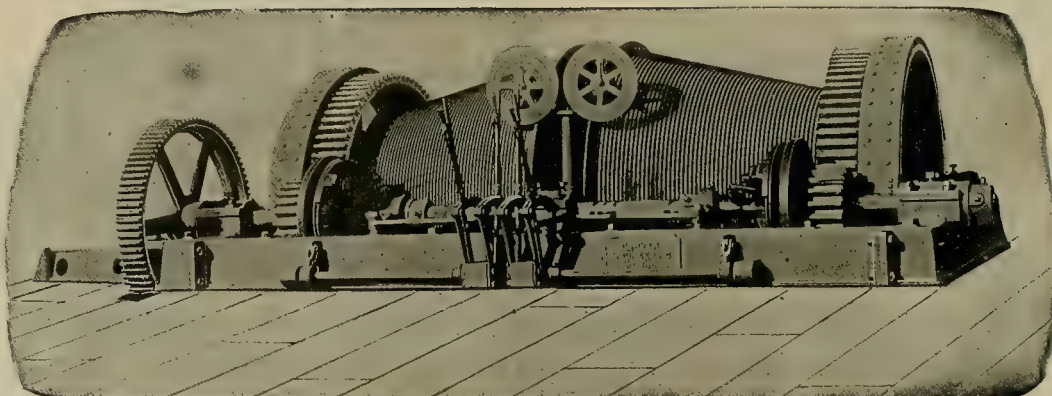
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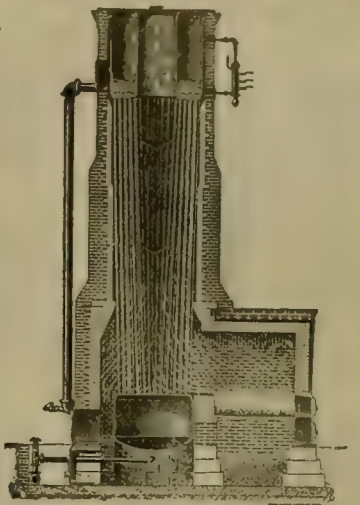
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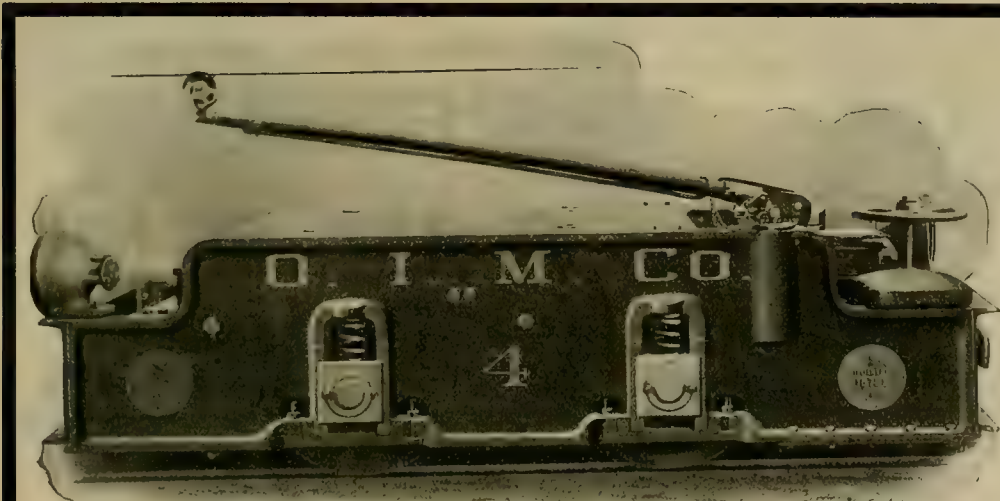


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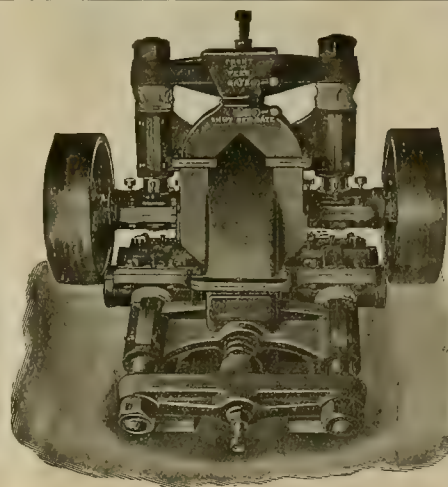
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Notice.—There are delinquent upon the following described stock, on account of assessment (No. 3) levied on the 26th day of March, 1901, the several amounts set opposite the names of the respective shareholders, as follows:

| Names.                   | No. Cert. | No. Shares. | Amt.   |
|--------------------------|-----------|-------------|--------|
| Allen, S. L.             | 110       | 12          | \$ 50  |
| Anderson, Mrs. Lulu      | 270       | 3           | 10     |
| Anthony, J. C., Trustee  | 797       | 1,000       | 50 00  |
| Anthony, J. C., Trustee  | 798       | 1,000       | 50 00  |
| Anthony, J. C., Trustee  | 799       | 1,000       | 50 00  |
| Anthony, J. C., Trustee  | 800       | 50          | 2 50   |
| Anthony, J. C., Trustee  | 801       | 500         | 25 00  |
| Anthony, J. C., Trustee  | 802       | 500         | 25 00  |
| Anthony, J. C., Trustee  | 803       | 500         | 25 00  |
| Anthony, J. C., Trustee  | 804       | 501         | 25 00  |
| Anthony, J. C., Trustee  | 805       | 1,000       | 50 00  |
| Anthony, J. C., Trustee  | 806       | 4,300       | 215 00 |
| Avery, Mrs. Jennie       | 716       | 5           | 25     |
| Avery, Mrs. Jennie       | 729       | 5           | 25     |
| Barto, Harrison          | 808       | 2,500       | 125 00 |
| Barto, Harrison          | 812       | 500         | 25 00  |
| Barto, Harrison          | 813       | 500         | 25 00  |
| Barto, Harrison          | 814       | 500         | 25 00  |
| Benecke, Diederich       | 93        | 1           | 05     |
| Bogkman, Mrs. Augusta    | 712       | 35          | 1 75   |
| Brown, Mrs. Ida M.       | 157       | 3           | 15     |
| Buckley, Morris          | 788       | 50          | 2 50   |
| Carr, B. W.              | 719       | 5           | 25     |
| Conn, Mrs. Sarah A.      | 529       | 20          | 1 00   |
| Conn, Mrs. S. A.         | 693       | 25          | 1 25   |
| Corbiere, C. G.          | 564       | 250         | 12 50  |
| Corbiere, C. G.          | 565       | 5           | 25     |
| Crew, L. T.              | 206       | 10          | 50     |
| Cridge, A. D.            | 503       | 1           | 05     |
| Cumberson, Mrs. Maria L. | 171       | 5           | 25     |
| Donnelly, Mary           | 43        | 14          | 70     |
| Dunlap, Mrs. W. B.       | 526       | 10          | 50     |
| Donahue, Benj. S.        | 1141      | 500         | 25 00  |
| Bells, Charles P.        | 884       | 2,000       | 100 00 |
| Bells, Charles P.        | 1127      | 10,000      | 500 00 |
| Estey, J. C.             | 1041      | 100         | 5 00   |
| Estey, J. C.             | 1048      | 20          | 1 00   |
| Falls, Sarah             | 557       | 0           | 2 00   |
| Petrow, Mrs. Maria W.    | 172       | 3           | 15     |
| Flak, Andrew J.          | 366       | 2           | 10     |
| Freese, A. J.            | 7         | 40          | 2 00   |
| Freese, A. J.            | 9         | 50          | 2 50   |
| Freese, A. J.            | 273       | 10          | 50     |
| Freese, A. J.            | 279       | 10          | 50     |
| Freese, A. J.            | 280       | 20          | 1 00   |
| Freese, A. J.            | 281       | 20          | 1 00   |
| Freese, A. J.            | 282       | 20          | 1 00   |
| Freese, A. J.            | 283       | 20          | 1 00   |
| Freese, A. J.            | 284       | 345         | 17 25  |
| Freese, A. J.            | 285       | 450         | 22 50  |
| Freese, A. J.            | 659       | 50          | 2 50   |
| Freese, A. J.            | 671       | 9           | 45     |
| Hildebrandt, Henry       | 256       | 65          | 3 25   |
| Hildebrandt, Henry       | 257       | 100         | 5 00   |
| Hildebrandt, Henry       | 258       | 1,000       | 50 00  |
| Hoover, John D., Trustee | 981       | 667         | 33 35  |
| Hoover, John D., Trustee | 1060      | 433         | 21 65  |
| Hoover, Miss Esther      | 979       | 100         | 5 00   |
| Holbrook, W. E., Trustee | 890       | 10,000      | 500 00 |
| Holbrook, W. E., Trustee | 898       | 11,000      | 550 00 |
| Holbrook, W. E., Trustee | 899       | 4,500       | 225 00 |
| Holbrook, W. E., Trustee | 900       | 4,500       | 225 00 |
| Holbrook, W. E., Trustee | 953       | 2,000       | 1 00   |
| Holbrook, W. E., Trustee | 954       | 2,000       | 1 00   |
| Holbrook, W. E., Trustee | 955       | 2,000       | 1 00   |
| Holbrook, W. E., Trustee | 956       | 2,000       | 1 00   |
| Holbrook, W. E., Trustee | 957       | 1,000       | 50 00  |
| Holbrook, W. E., Trustee | 958       | 1,000       | 50 00  |
| Holbrook, W. E., Trustee | 959       | 1,000       | 50 00  |
| Holbrook, W. E., Trustee | 1000      | 1,000       | 50 00  |
| Holbrook, W. E., Trustee | 1001      | 1,000       | 50 00  |
| Holbrook, W. E., Trustee | 1118      | 2,000       | 100 00 |
| Holbrook, W. E., Trustee | 1119      | 2,000       | 100 00 |
| Holbrook, W. E., Trustee | 1123      | 2,000       | 100 00 |
| Kessling, E. L.          | 838       | 15          | 75     |
| Lucas, Mrs. T. B.        | 845       | 10          | 50     |
| McGuen, Mrs. N.          | 305       | 2           | 10     |
| McCallister, H. L.       | 1071      | 100         | 5 00   |
| Murray, Peter William    | 70        | 1           | 05     |
| Niederost, August        | 207       | 28          | 1 40   |
| Opitz, Conrad E.         | 843       | 10          | 50     |
| Peters, W. S.            | 60        | 15          | 75     |
| Peters, W. S.            | 333       | 500         | 25 00  |
| Peters, W. S.            | 672       | 5           | 25     |
| Pipher, Jos. E.          | 102       | 2           | 10     |
| Reynolds, Timothy        | 3         | 5           | 25     |
| Schindler, Louis C.      | 303       | 2           | 10     |
| Shead, Mrs. Dora L.      | 920       | 100         | 5 00   |
| Smith, James B., Trustee | 985       | 1,000       | 50 00  |
| Smith, James B., Trustee | 986       | 1,000       | 50 00  |
| Smith, James B., Trustee | 987       | 1,000       | 50 00  |
| Smith, James B., Trustee | 988       | 1,000       | 50 00  |
| Smith, James B., Trustee | 989       | 1,000       | 50 00  |
| Smith, James B., Trustee | 990       | 1,000       | 50 00  |
| Smith, James B., Trustee | 991       | 1,000       | 50 00  |
| Smith, James B., Trustee | 992       | 500         | 25 00  |
| Tarpey, W. J.            | 675       | 14          | 70     |
| Walser, Mrs. Lizzie      | 312       | 125         | 6 25   |
| Young, Richard           | 746       | 91          | 4 55   |
| Young, Richard           | 754       | 167         | 8 35   |
| Young, Richard           | 758       | 100         | 5 00   |
| Young, Richard           | 761       | 225         | 16 40  |

And in accordance with law, and an order from the Board of Directors, made on the 26th day of March, 1901, so many shares of each parcel of such stock as may be necessary, will be sold at public auction at the office of said corporation, in Rooms 322-323 Parrott building, San Francisco, California, on MONDAY, the 27th day of May, 1901, at the hour of 1 o'clock P. M. of said day, to pay said delinquent assessment thereon, together with costs of advertising and expenses of sale.

J. C. ANTHONY, Secretary.  
Office—Rooms 322-323 Parrott building, 325 to 355 Market St., San Francisco, California.

## POSTPONEMENT.

By order of the Board of Directors, the day of sale of the above delinquent stock has been postponed to MONDAY, the 24th day of June, 1901, at the hour of 1 o'clock P. M., at the office of said corporation in Rooms 322-323 Parrott building, San Francisco, California.

J. C. ANTHONY, Secretary.  
Office—Rooms 322-323 Parrott building, 325 to 355 Market St., San Francisco, California.

## POSTPONEMENT.

By order of the Board of Directors, the day of sale of the above delinquent stock has been postponed to MONDAY, the 24th day of July, 1901, at the hour of 1 o'clock P. M., at the office of said corporation in Rooms 322-323 Parrott building, San Francisco, California.

J. C. ANTHONY, Secretary.  
Office—Rooms 322-323 Parrott building, 325 to 355 Market St., San Francisco, California.

## CRIPPLE CREEK SHORT LINE.

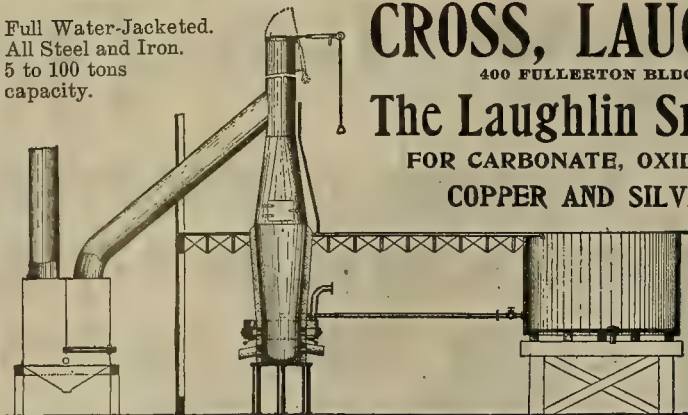
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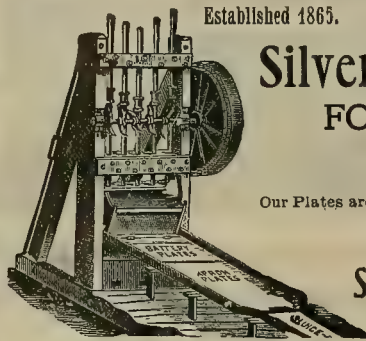
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A. MERLE, President.

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## ASSESSMENT NOTICES.

WILLIETTA MINING & MILLING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Tuolumne County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 11th day of June, 1901, an assessment (No. 1) of one (1) cent per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, Room 8, 206 Sansome street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 10th day of July, 1901, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 12th day of August, 1901, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

FRANK E. CORDES, Secretary.  
Office—Room 8, 206 Sansome street, San Francisco, California.

MARIPOSA COMMERCIAL AND MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Mariposa County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 15th day of June, 1901, an assessment (No. 2) of Ten (10) Dollars per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, Room 223 Crocker Building, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 10th day of August, 1901, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 2nd day of September, 1901, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

ALEX. GRANGER, Secretary.  
Office—Room 223 Crocker Building, San Francisco, California.

TANANA MINING COMPANY.—Location of principal place of business, San Francisco, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 14th day of June, 1901, an assessment (No. 3) of ten (10) cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, Room 801 Claus Spreckels Building, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 23d day of July, 1901, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on TUESDAY, the 13th day of August, 1901, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

EDWARD H. STEARNS, Secretary.  
Office—Room 801 Claus Spreckels Building, San Francisco, California.

YUBA CONSOLIDATED GOLD MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Nevada County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 22d day of June, 1901, an assessment (No. 2) of three cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin to the secretary, at the office of the company, Room 801, Claus Spreckels Building, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 30th day of July, 1901, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 19th day of August, 1901, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

EDWARD H. STEARNS, Secretary.  
Office—Room 801, Claus Spreckels Building, San Francisco, California.

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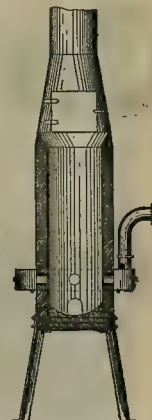
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CONSOLIDATED ST. GOTHARD GOLD MINING Company.—Location of principal place of business, San Francisco, California; location of works, Nevada County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 9th day of July, 1901, an assessment (No. 19) of ten cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 113 Crocker Building, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 13th day of August, 1901, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 2d day of September, 1901, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

B. N. SHOECRAFT, Secretary.  
Office—113 Crocker Building, San Francisco, California.

EUREKA CONSOLIDATED DRIFT MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Placer County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 9th day of July, 1901, an assessment (No. 31) of one-half cent per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin to the secretary, at the office of the company, 214 Pine street, room 31, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 15th day of August, 1901, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 2d day of September, 1901, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

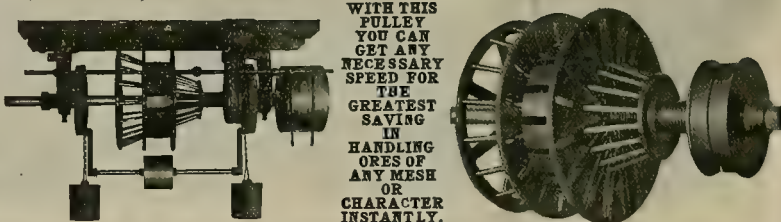
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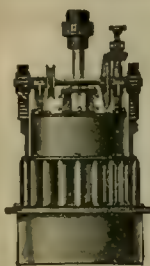
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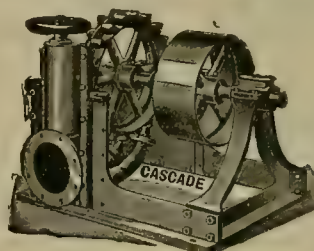
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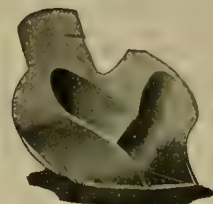
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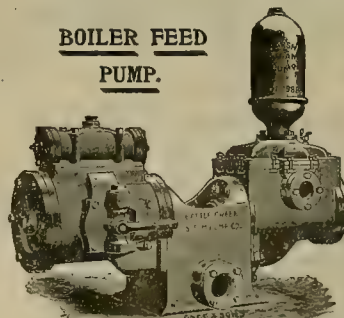
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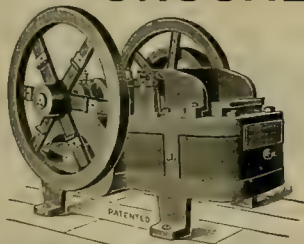
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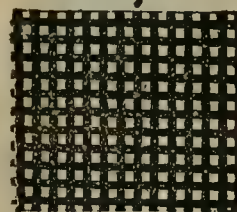
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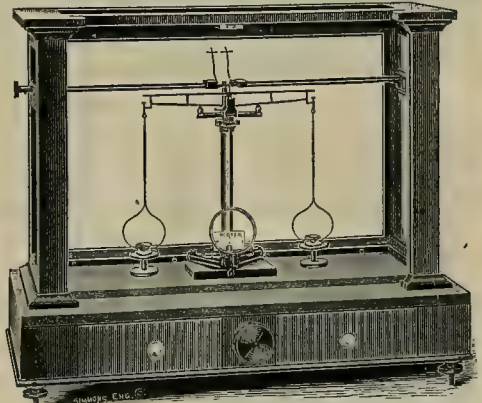
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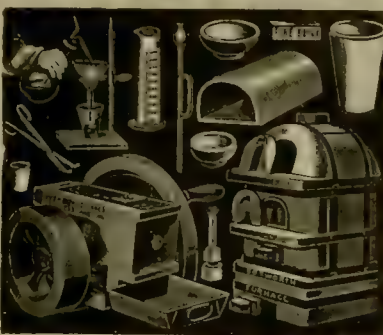
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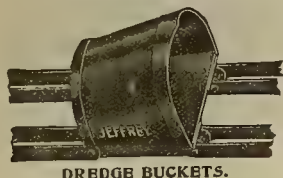
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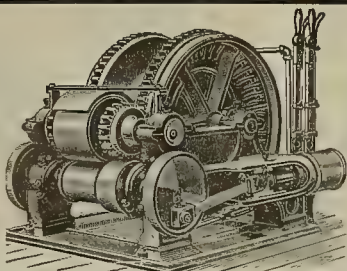
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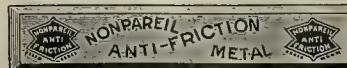
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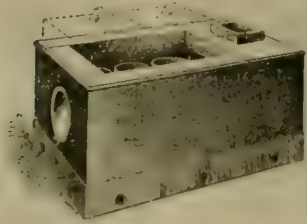
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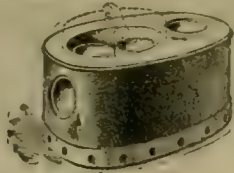
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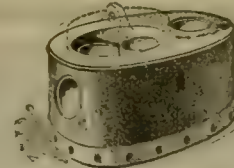
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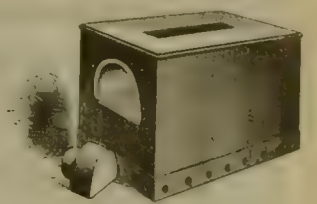
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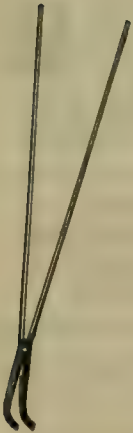
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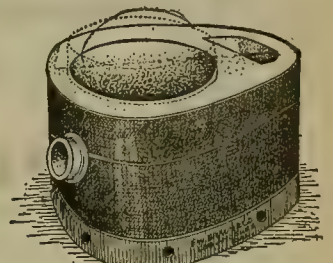
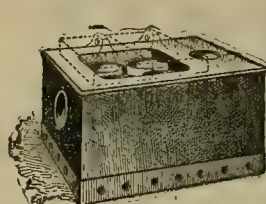
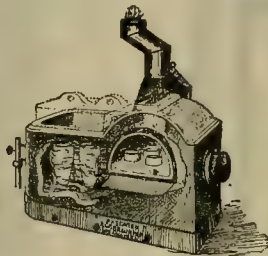
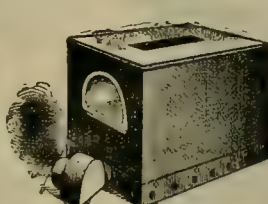
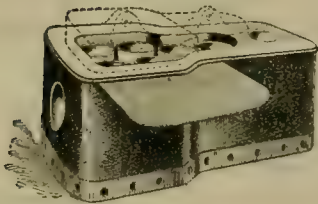
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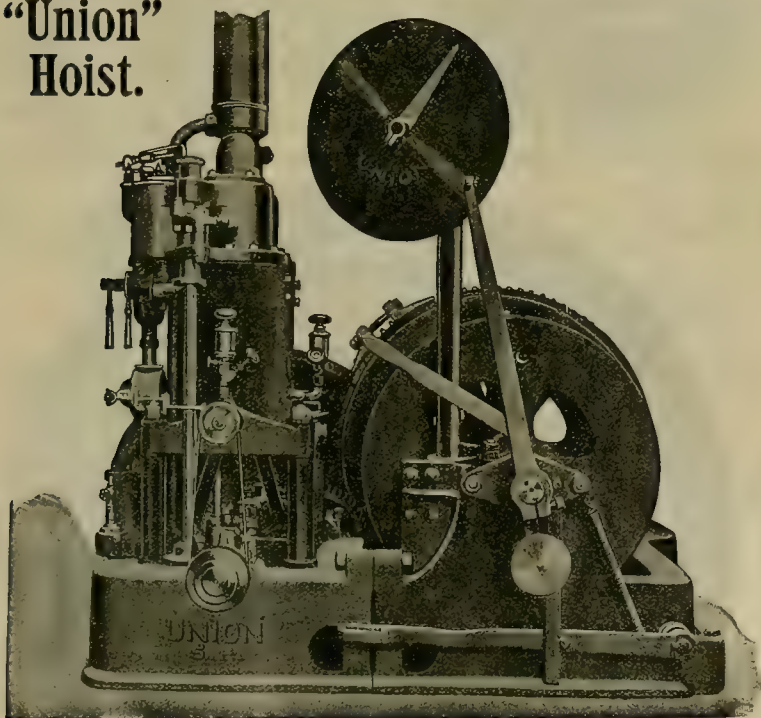
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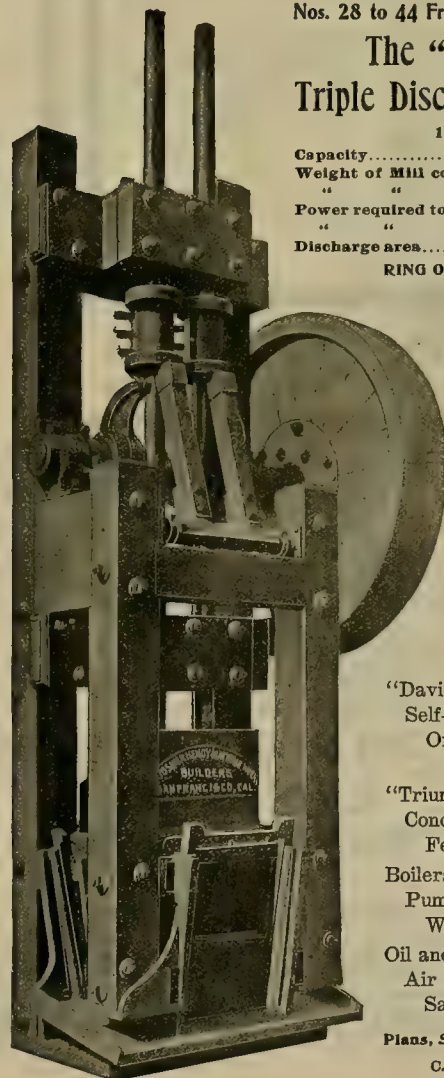
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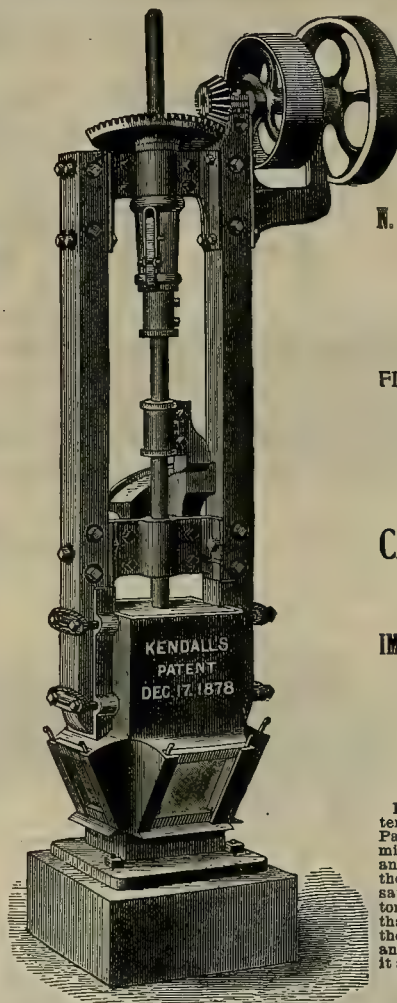
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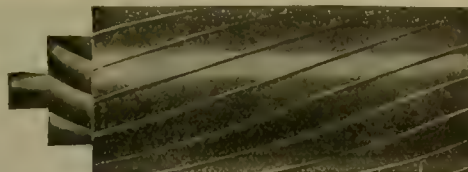
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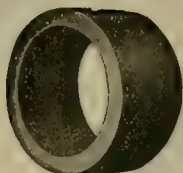
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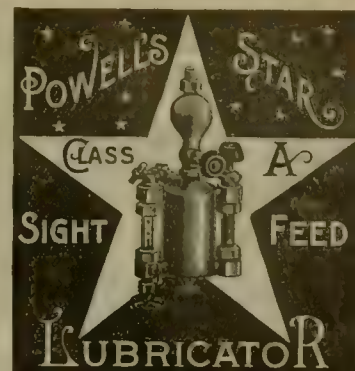
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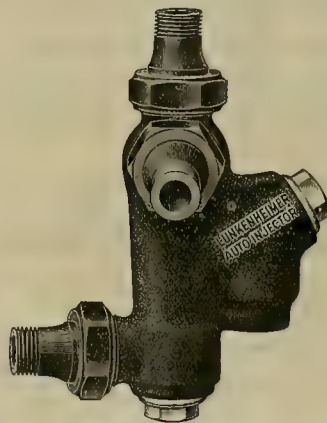
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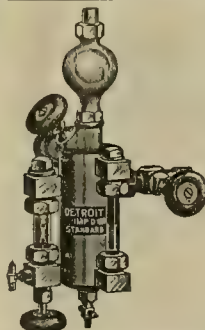
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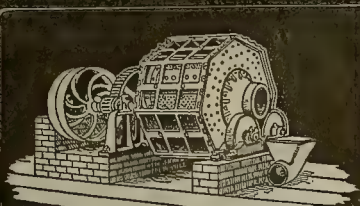
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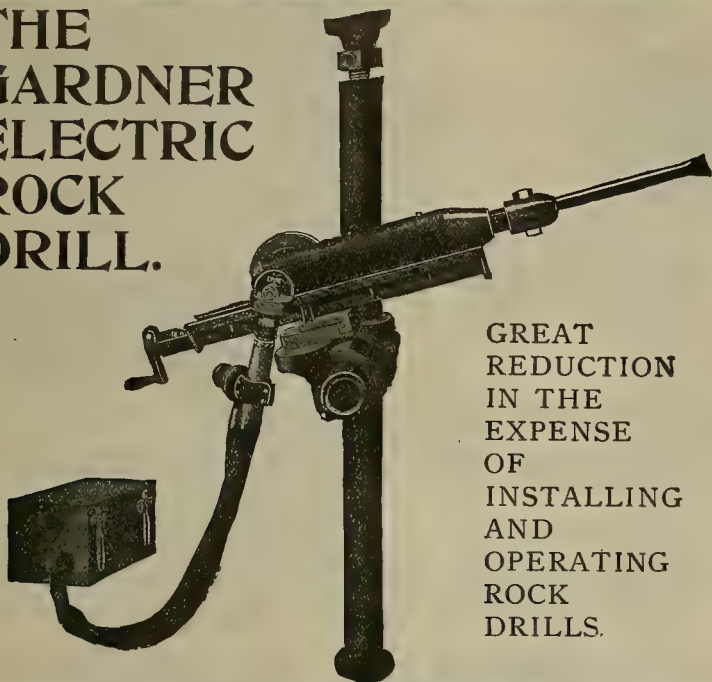
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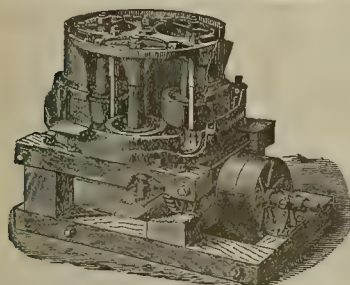
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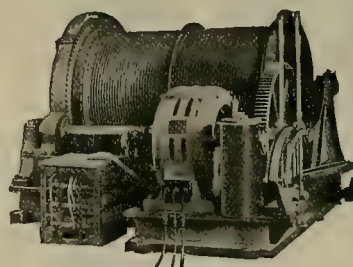
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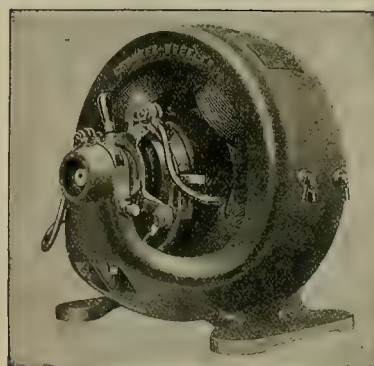
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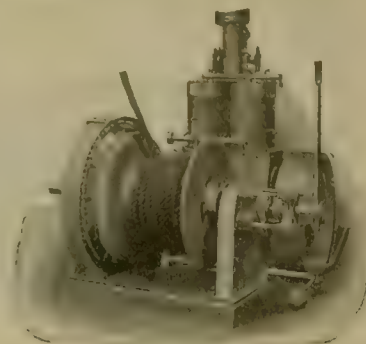
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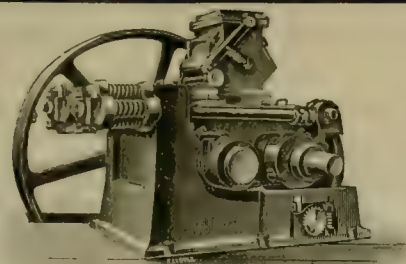
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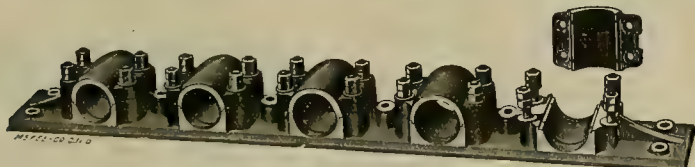
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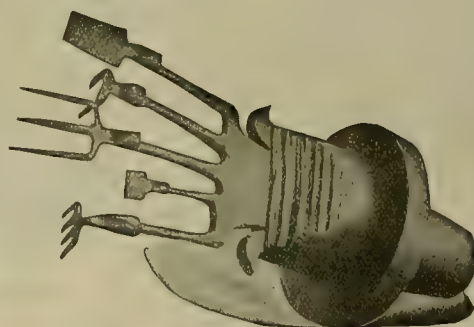
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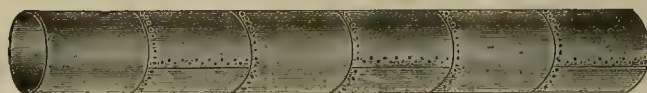
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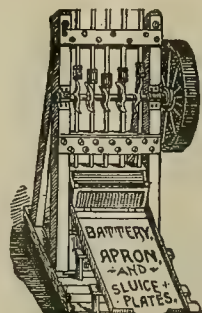
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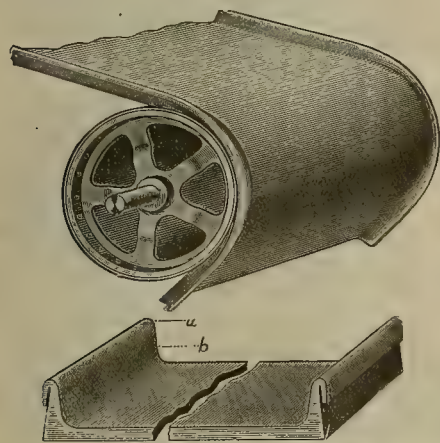
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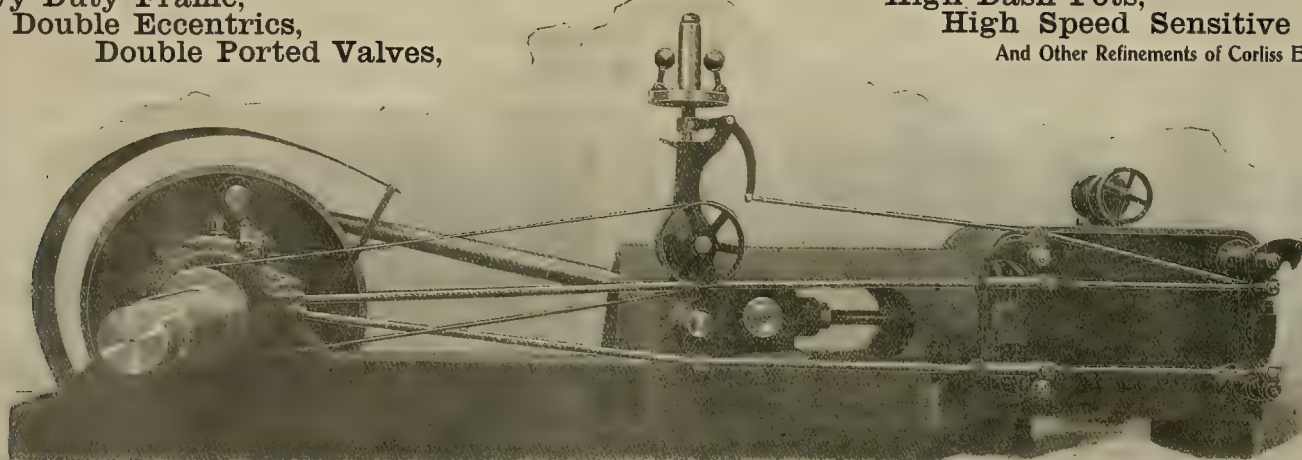
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SAN FRANCISCO, SATURDAY, JULY 20, 1901.

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Taxation of Mines.

Great Britain, to recover the cost of the war with the Transvaal, has announced an intention of assessing a royalty on the gold production of the Rand mines, and has indicated 10% of the value of the gross yield as the probable amount of the royalty. The Canadian Government has for three years collected 10% royalty on the gross placer gold production of the Yukon Territory comprehending the Klondike, and this year has reduced the amount and is collecting 5%. The Russian Cabinet exacts 20% royalty of the gross gold yield of its placers. The Korean Government, with different concessions, has made different royalty rates on the gross gold yield up to 20%. One concession made the royalty on all metals and coal 20%. The Netherlands Government exacts high royalties and other taxes on mine production in the Dutch East Indies. The Government of British Columbia has several grades of royalty on gross metal production and a large number of indirect fees and charges that are paid for the privilege of mine operation, regardless of whether the mine is producing metal or is not producing it.

In the United States, Nevada had a bullion tax which was the equivalent of a royalty on the gross value of the metal production. It has been repealed. Montana imposes a 3% tax on the net annual profits of mining, on the net value production instead of the gross. Most of the States and Territories attempt to tax mines on their property value uniform in its incidence with the taxation of other property. Practically it is only an attempt. In Colorado the attempt has been made to tax mines on the basis of an assessment value determined by the selling value of the stock. Very generally in other States the mines that are not producing are taxed on far higher relative assessments of valuation than the producing and profit-earning mines of the same district. The writer has in mind an instance where a mine, paying its owners \$200,000 net out of a gross production of \$260,000 in one year, was that year taxed \$160 on a valuation of \$10,000. A mine alongside of it that did not produce a dollar of value, and in fact never did, having a finer plant of machinery, was taxed \$240 on an assessment valuation of \$15,000. The facts were known at the time, yet there was no protest at what would reasonably seem an absurd inequality in comparative valuation for taxation.

Through all these royalties and taxes there seems

a general recognition that taxation of mines and mineral productions of mines was based on different principles from the principles applied in taxing other properties. Just what the differences are does not seem to be definitely recognized. There is no common starting point for the rules of taxation and clearly no general recognition of the real thing that pays the royalties and taxes. Montana alone of all the sovereignties imposing mining taxes seems to have recognized what it was paid taxes and to have based its taxing laws on it.

A mine is not a reproductive property. Its yield of metal or mineral is not production in the same sense that a yield of agricultural or pastoral products is production. In the last case the land that produces can produce again; with a mine the yield is some of the valuable or reproductive part of the land itself and diminishes the total to the extent that it is removed. In the case of agricultural land and other such properties the tax is paid by the reproduction of the land; with land that is mined the tax is paid by the delivery of part of the land itself.

Taxation of agricultural land does not therefore absorb the land itself, no matter how long the period of years cumulated. Taxation of mines can absorb the land itself within a finite period of years, and it may be within a very short period. Therefore it is that practically mine taxation should deal with mine production rather than with mines, mining lands or the tools and machines of mining. Royalties are therefore more equitable in principle than taxation of mines on assessment of the land of the mines on the current exchange value of such land. With royalties the business of making a mine and the expectation of getting it are not taxed. With taxation based on current exchange value of the land both the business of making a mine and expectations are taxed.

To illustrate the preceding: A 1000-acre tract of



Interior Lightner Chlorination Mill, Angels, Cal. (See page 25)

placer gold-bearing land is provided with appliances, using which it will require 100 years to work out the gold. That is to say, the gold from ten acres only is obtained each year. With the current exchange valuation for assessment by which each acre is assessed equally with another, gold which must remain in the ground ninety-nine years before it is removed and available for division between the miner and the tax gatherer, is assessed and taxed exactly the same as gold mined the current year, and this last gold must pay the tax for the other gold. With ordinary tax rates of 2% to 3% the last gold to be mined would have had paid for it in taxes in advance two to three times its amount, exclusive of interest. It might suggest itself that the current exchange value of such land is too high; but that is another story.

Royalty on gross production in distinction from royalty or tax on net production is an unbusiness-like principle of taxation in that it fails to take into account the commercial idea. The production of a mine is divisible into two parts. One of the parts is given by the miner as costs and expenses paid in order to reduce to his personal possession the other part. The taxation by gross royalty limits the extent of the mining industry by limiting the number of mines that are workable. Gross royalty taxation may entirely wipe out the part of the production available as profit. The royalty on gross production taxing the cost of production is really double taxation. It is taxed both as the property of the miner and as the property of the people he has given it to.

The entire production of a mine is personal property. In the mine the mineral that may become production is not real estate; its status is not definable as personality; it is attached to the land. When removed from the land it is personality, but is not all the property of the one who removes it. Some is given up in costs. The net is the realizable personality. It is all that so far as the owners of the mine are affected is property—it is all on which they should be taxed.



Lightner Chlorination Mill, Angels, Cal. (See page 25.)

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COPPER MINING and reduction in all the countries of the world are being reported on by the United States consuls, at the request of the State Department, and the information gathered is now being printed and distributed in advance sheets. The data given are up-to-date and valuable in suggestion to copper miners in the United States, though no effort is made to give technical details. Reading the papers, the impression is fixed that the metallurgical advantage of the United States is in the quantity and richness of its ores. The mining and metallurgical practice of foreign countries would appear to be keeping up with advances in the technology of the art. The men who mine and reduce the metal in foreign countries are taking every advantage of possible economies of production, exactly as are our own miners and metallurgists, and are proportioning their work to results, just as our own people are. Still it seems clear that supremacy in production is assured to the United States and that the problem of profit in the business is to be worked out here.

THE ruling of the U. S. Secretary of the Treasury, that gold dust and gold bullion from gold mines in foreign countries, brought into the United States for assay and sale, must be accompanied with a consular invoice and enter subject to customs regulations, the same as any other form of merchandise, is calculated to subject the American and other miners in the Yukon, who desire to have it assayed and converted into money through the Seattle, Wash., assay office, to the loss of an additional shave on the gold production of their mines. The basis of the decision is that gold dust and such mine bullion is not money or "medium of exchange" between bankers, therefore it is merchandise. The consular invoices and customs entry fees are charges that the gold must pay, for which there is not visible the slightest return of service. The establishment of a Canadian Government assay office at Vancouver, B. C., and the establishment of a mint at Ottawa, Ontario, do not get around the difficulty at all. The gold leaves Canadian territory at White Pass summit, on the land side of Skaguay, Alaska. To reach either place provided by the Canadian Government where the gold could lose its merchandise standing and become a medium of exchange it would have to go through Alaska in Canadian charge under bond, which involves more unproductive expense. A Canadian Government assay office at Dawson, as suggested by this journal, would clear the difficulty entirely, and the miners would be given an additional incentive to turn their gold into the assay office and to pay the royalty. The present effect of the ruling is to in-

crease the gold production of Alaska at the expense of the Canadian Yukon, by providing an additional profit to successful dishonesty in avoiding the payment of the royalty.

The International Mining Congress.

The International Mining Congress which assembles at Boise, Idaho, on the 23d inst., will soon have made its record of action and recommendation part of the constructive history of the mining industry. Concerning its probable results the great changes that have been made during the year just passing, through the application of the modern commercial idea to mining, are educational in their suggestion of changes and improvements that will promote the mining industry through the initiative of the Congress.

The dominant commercial ideas applied to the business of mining are economies effecting a reduction of the cost charges on mineral production and organization insuring a profit to the capital engaged in the business. In such action as the Congress may take and in such recommendation as it may make these same commercial ideas should be controlling. In the United States the business of mining should not have to recognize State or boundary lines other than national. Political and legal conditions should be the same in all the States, Territories and dependencies of the United States.

First of all in importance as contributing to the purposes for which the Congress meets, is the initiation of political action to secure the establishment of the National Department of Mining and a Secretary of Mining as first proposed many years since by this journal. With this department and an advisor of the President the business of mining in the United States would be in the position to secure the same national commercial gain that has come to agriculture through the establishment of a Department of Agriculture and a Secretary of Agriculture. Both an economy of cost in mineral production and an aid to organization to insure profit will come from the proposed political action becoming successful.

In recommendations relative to changes and additions to the existing mining laws there are many that the Congress can make specific. It may be suggested that the importance of some of those here considered warrant the initiation of political action to back up the recommendation to legislative action.

The Congress should be specific in recommending the abolishment of extralateral rights as an appurtenance of lode locations made after a fixed date. The square form of location for all locations is a detail that is suggested for inclusion in the declaration of the Congress. The change would be an economy in cost charges against mining by a large elimination of non-producing litigation expenses. The argument sustaining the change proposed has been set out in detail in this paper so frequently that its restatement here would be superfluous.

The Congress should be specific in its recommendation of such changes in the law of location of mining claims that discovery of valuable mineral made and declared should be the condition precedent to the making of a location. The precedent of Colorado miners and courts establishing this principle and basing on it a marvellously successful development of that State's mineral deposits, can well be considered the authority for the suggested recommendation of the Congress. The possibility of abuse under existing law through court constructions of the law, to which reference is made in detail elsewhere on this page, is the conclusive argument sustaining the necessity for the prompt action of the Congress in the matter.

The Congress should consider and declare such principles of taxation of mines and mining claims that they could be accepted as the basis of substantially identical taxation legislation in the several States and Territories. There is no uniformity in practice, and great inequality in taxation of mines in the several States and Territories. The reason for this condition, which should not exist, is principally lack of knowledge of logical principles from which to make the taxation. Montana seems to have practically applied the correct principle, and from it has evolved the plan of only taxing directly the net profits of the mines based on sworn declarations. The principle logically sustaining this plan is that the

value of a mine is solely in its realizable personality. The net product of a mine is personal property; it is the only property created by mining; and it does not exist as property until it is out of the earth and reduced to personality. The Montana plan of mine taxation is suggested to the Congress for investigation as the basis of declarations of principles of mine taxation.

The preceding all relate to the business of mining. They all relate to details of mining business which have numerical expression in dollars. It is business to consider them. It is business to intelligently and positively act as indicated by the conclusions of the consideration.

One matter—which is not business, but is a matter of sentiment connected with the mining industry—is commended to the consideration of the Congress for declaration of policy and recommendation. Col. N. E. Linsley of Spokane, Wash., in a communication to this journal some months since, very ably and convincingly advocated the establishment of a home for old prospectors. Since the communication appeared, published comments and private endorsements of the idea indicate that the beginning of the realization of the establishment is within the possibilities. Col. Linsley's word picture of his proposed home is of its maturity. The beginning can be on a more modest scale. It will be none the less a beginning because it is small. Like other things, it will grow. The Mining Congress, by its action, can make a Home for Old Prospectors which shall be an imperishable monument of its accomplishments.

A Bad Rule of Mining Location.

The establishment of a rule of mining location that a prior discovery of valuable mineral is not necessary to make a location will prove extremely mischievous in practical operation. It is the opportunity for fraud. In combination with other rules of the law it permits of an unlimited number of locations appropriating for any actual purpose vast areas of public land so long as the ostensible purpose is indicated as mining by compliance with forms of location. It would validate the abuses that have developed at Nome and other Alaska districts. It would validate such abuses as the appropriation of a strip of land 30 miles long and 3 to 5 miles wide made in Fresno and San Benito counties, Cal., by half a dozen people ostensibly for petroleum, though there is not a discovery of petroleum on the land. It would render possible the appropriation of the so-called public grazing lands in the Rocky mountain region. It makes possible a defeating of the national public policy in relation to the disposition of its public lands for the benefit of the people of the nation. The decision is probably the most vicious declaration of a court yet made affecting the law of location of mining claims. The opposite rule, that minerals of value must be discovered on the claim and declared in the location notice can work no private hardship and is a protection for the public and an advantage for it. What public policy and national industry require is that the valuable mineral shall preferably be out of its earth or rock storehouse and available as a commodity. Next to this preference it wants such valuable mineral proven in place commercially. The mining statutes of the United States were intended by Congress to promote this policy. The reward for private enterprise incident to the obtaining of the benefits of the public policy is purely subordinate to the benefit to the public. Consider the particular issue in the case on which the California trial court ruled recently where the validity of oil location was the issue. Is not the public more benefited by two wells or twenty wells bored on the same 160 acres for petroleum than by the boring of one well or no well at all? Is private enterprise rendered the less remunerative to the owner of the one well which first finds the petroleum by the rule that the discovery must be made before the location? Under the rule the owner of the well making the discovery would be able to include in his location and to appropriate the other nineteen wells or whatever number there were. The public who invest in the stocks of oil companies would have an incidental protection against fraud by the limitation of its field of activity. Except by criminal misrepresentation oil companies could not sell stock based on locations of oil lands unless discoveries of oil had been made.

Concentrates.

AN automobile has been successfully employed on mountain roads in California.

THE mineral from Gold Creek, Nev., said to be bedded with shale and limestone, is coal.

IT has been figured out that the average of the life or dividend period of mines is seven years.

A SPECIMEN received from Quartzite, Ariz., is chromite, commonly known as chrome iron.

THE production of the mines of Leadville, Colo., during the seventeen years since 1885 is \$177,020,926.

THE oil tank recently made for the Market Street Railway Co. of San Francisco is 90 feet in diameter and 30 feet high, and contains 1,280,000 gallons.

ABOUT the lowest head of water which is worth commercial utilization for power development is 6 feet. Turbine wheels are used with this very low head.

IN 1860 the steam consumption in the best engines was about 35 pounds per horse-power hour. It is now about one-third of this, less than 12 pounds per horse-power hour.

ELECTROMOTIVE FORCE (E. M. F.) is the name given to the energy given off by an electrical battery or generator which on the circuit appears as pressure and is the cause of all the electrical effects.

THERE are three zinc minerals mined commercially in the Missouri zinc district, the sulphide, sphalerite, the silicate, calamine, and carbonate, smithsonite. The first named is the commonest and most valuable.

PORTLAND cement can be manufactured from any rock materials having the proper ingredients in proper proportions, and variations in the method of manufacture admit of modifications in the proportions.

IT is estimated that under proper supervision of the cutting the forest reserves of the United States might be capable of supplying nearly a fifth of the annual consumption of lumber at the present existing rate.

THE Birmingham gauge (B. W. G.) is used in England for all kinds of wire and in the United States for iron wire. The American wire gauge or Brown & Sharpe (A. W. G. or B. & S.) is used in the United States for copper wire.

THE amount and condition of the carbon are the principal matters which regulate quality of a cast iron, and the usefulness of silicon and sulphur are important and chiefly useful from their effect in modifying and changing the influence of the carbon.

A PATENTED solder for aluminum contains among its ingredients an alloyed flux of phosphorus and tin. The flux removes the coating of oxide of aluminum instantaneously and the solder then takes hold of and joins the clean surfaces. In soldering the tool must be kept very hot and the metal parts to be joined should be heated.

AS the result of comparative tests of California and Texas fuel oils by the Southern Pacific Railroad the former was found to be about 2% the better in evaporative power. Theoretically the Texas oil should have proven the better owing to a lower proportion of oxidized oils.

AT the Rossland, B. C., mines the powder used in the stopes averages 1½ pounds 50% nitro-glycerine to the ton of ore broken. In advancing level or crosscut headings 10½ pounds to the foot is used. For the sinking of a shaft 9x20 feet the consumption of powder averages 25 pounds to the foot.

THERE is no general rule for fixing the percentage for depreciation of machinery used in mining or in fact of machinery used in any of the industries. With a mine producing, and with ore in reserve for the year's operation, a fixed sum equal to a fourth or fifth of the original cost in place would at the end of the mine operation prove not far from the actual fact.

IN France an improvement in the metallurgy of copper by the converter method is reported by which gold and silver during the converting are concentrated out of the mass of the copper into a copper alloy in the bottom of the converter, which is then parted by electrolytic treatment. The main mass of the copper is, however, produced so free of gold and silver that it does not require the electrolytic treatment.

IN the flow of water through a pipe the greater part of the head is employed in overcoming the resistance of the pipe to the flow. A smaller part, known as the entry head, balances the resistance to entry into the pipe of the water and the remaining portion gives the velocity to the water. Except in cases where the velocity is high the sum of the entry head and the velocity head will be less than 1 foot.

SULPHUR in coal can be present to a considerable percentage without danger of corrosion of firebox plates or tubes when used under a boiler. The fumes of dry sulphurous acid are not corrosive to iron plates at high temperatures. With water and a temperature less than 212° F. the corrosive acid is formed, but these conditions do not occur until the fumes and water gas of combustion are out of the firebox and boiler tubes.

THE locator of a mining claim has a right to the ownership of any abandoned improvements—such, for example, as a house—on the land within the stakes marking the boundary line of the location. Improvements that are not abandoned cannot be acquired by location

of a mining claim alone. They, however, become acquired by the mining claim locator when the location is patented. A miner does not lose the house he lives in by his forfeiture of the mining claim he built it on. He can lose it by the Government patenting the land to some other person.

TEXAS fuel oil differs considerably from California fuel oil. The former has a gravity about 22° Baume as compared with 14° to 16° Baume, flashing point 180° F. as compared with about 240° F., firing point 200° F. compared with 290° F., and its weight averages 7.43 pounds to the gallon as compared with 8 pounds to the gallon. The Texas oil contains the most sulphur and the California oil the more alkali and salty waters.

TOOL STEEL can be hardened without discoloring or oxidizing it by the use of common laundry soap. It can be applied to the article before heating it, but preferably just after heating it sufficiently to cause the soap to flow. The soap so applied covers the steel with a thin coating, which remains till the article is immersed in water, where it washes off or is removed by waste. The color of the steel is perfectly white and the surface absolutely clean.

SHEET IRON or steel No. 16 American gauge is $\frac{1}{8}$ -inch thick and weighs 2.5 pounds per square foot. No. 11 gauge is $\frac{1}{4}$ -inch thick and weighs 5.0 pounds per square foot. From No. 11 the decreasing gauge numbers are successively $\frac{1}{8}$ -inch more in thickness and .625 pound more in weight per square foot. Thus No. 5 gauge would be $\frac{3}{8}$ -inch thicker than No. 11, making it $\frac{1}{2}$ -inch thick, and would be .625 pound $\times 6 = 3.75$ pounds more in weight, making it 8.75 pounds per square foot.

THE laws of mining and other corporations in California have been changed by the new code going into effect July 1, 1901. It is no longer obligatory to adopt by-laws. A director elected to represent a minority cannot be removed without cause. The holders of a majority of the capital stock can call an election, though they number less than three. In all voting at meetings the books are conclusive evidence of the right to vote. Certificates of stock on which less than full payment has been made must show the amount that has been paid in. A method of replacing lost stock certificates by the issuance of duplicates is provided.

OLD PEWTER and britannia ware can be converted into commercial metal. The silver plating is first removed by putting the articles into nitric acid in a porcelain-lined pot. The articles are then thoroughly washed and dried. They are then broken up and melted, and, by changing the composition by the addition of tin, lead, antimony or copper, type, stereotype and babbit metal are obtained. When the acid taking up the silver is nearly neutralized, salt is added, which precipitates the silver as chloride. This is caught on a filter, fused in a black-lead crucible with flux, and thus reduced to metallic silver.

FOR massive concrete work it is often safe and practicable to use in the body of the structure large boulders and pieces of broken stone and thereby effect a considerable economy of cement where the economy is important. Where such material is used it should be solid and clean and should not contain iron oxides or sulphides, but be of similar character to the broken stone employed in the concrete mixture. As much as 30% of this coarse stone can be used. In the construction of the overflow dam and ditch headworks in the American river at Auburn, Cal., the large stream boulders and cobbles were so used. The fine gravel and sand just as it came from the river bed was used in mixing the concrete. The dam is over 300 feet long and has a midstream height of 40 feet.

THE quantity of water flowing in any channel is obtainable in cubic feet per second by multiplying the cross-sectional area of the waterway by the mean velocity of flow. The important point is the determination of this velocity. Floats are timed over a measured length of channel, several tests being made in different lines of parallel flow. The surface velocity for different sections is thus obtained. The velocity is much less at the bottom and sides of a channel and the average velocity is ordinarily between 80% and 90% of the maximum surface velocity. Generally 83% is taken as the coefficient. The quantity of flow then becomes equal to the cross-sectional area of the waterway multiplied by .83 of the surface velocity determined by floats. A second method of getting at the quantity of flow is by measuring the discharge through an orifice, either a tube or weir. The critical point of this method is the measuring of the head under which the flow is maintained.

THE law of mining claim location has been further complicated by the decision of a trial court in Kern county, Cal. The court held in a case over the right under location to a tract of land claimed for petroleum that the prior locator was entitled to it, though it was admitted that the junior locator had made the actual discovery on the land by boring a well. The rule here laid down has always been accepted between locators of drift placer mining ground under lava or cement deposits where discovery required long expensive prospect tunnels. The Land Department has taken precisely the opposite ground by refusing to patent such locations without an actual discovery on the claim, and in some rulings have required discovery on every ten acres, and have further required that proof should show a minable pay deposit. The decisions of the Colorado State courts and the U. S. courts in cases arising in Leadville made a rule requiring discovery of mineral in place a condition

precedent to location. It would appear that the decision of the United States Supreme Court is necessary to establish the law of discovery.

IN filing and setting saws attention should be paid to certain points. The teeth in crosscut saws should cut both ways. In every saw, crosscut and rip, the teeth should, as near as possible, be equal in length and equal in sharpness. The bevel on the tooth should be more acute for soft than for hard woods. In filing to get the same bevel, the file should be held at the same angle for all the teeth, and the same number of strokes with the same pressure should be given. Uneven teeth should be beveled with a flat file before starting to sharpen and bevel. Filing should be done from the handle toward the point. In no case should the saw be lower in the middle than at the ends. The feather from the sides of the teeth should be removed with a flat file or whetstone drawn smoothly over them with a very light pressure. The setting of the saw is important, as it controls the width of the kerf. The amount of the set depends on the character of the work and is a matter of personal judgment. Uniformity of the set must be secured. Either a hammer and punch is used in setting or a special tool of a lever type. The use of either requires practice and care.

THE United States Circuit Court has ruled in an Idaho case that mining claimants in a forest reservation can construct a water ditch in the reservation for their mining claims under the special conditions of the case in which it appears that the entire length of the ditch is on the mining claims. In the same decision the court ruled that as it appeared that the several mining claims were held in common, and that so long as it appeared they were located in good faith as mining ground, the claimants may use the timber from one claim upon another, but only for mining purposes. The right to export or sell the timber, or use it for any other purpose, is denied. The mining claimants are not permitted to cut any timber on the reserve outside of the claims except under authority of agents of the Secretary of the Interior. The ruling is only temporary pending the hearing of the case, but is fairly indicative of what the final decision will be. It seems to suggest that the courts will rule against the construction of ditches in forest reserve lands on the ground that there is no express authority of law directly permitting such construction, and no procedure provided in the Acts creating the forest reserves by which private parties can acquire the right of construction. The United States is plaintiff in the action, which is for an injunction. The decision was on the application for a temporary restraining order.

WHERE a lode location of a mining claim is made and it subsequently appears that the lode, instead of crossing the end lines of the location, crosses the side line, the rule of law is that the side lines become the end lines, and the extralateral right extends under and beyond one of the end lines and the side lines become the lines of the vertical end planes. If the claim has become patented before the discovery of the true apex line of the lode is made, the title to the surface has become vested and carries with it all other lodes that may apex within it. If the discovery is made before patent issues, any veins that apex over 300 feet away would seem to be subject to location. The law limits the width of ground to 300 feet on the sides of the apex line of the lode. The law will not make valid a location that does not conform to the law, simply because it was not so made intentionally. At the same time the law cannot be construed to deprive the locator of what he really discovered and located. No right, valid under the original location, loses its priority by reason of relocation to correct a mistake. The best plan under the conditions stated—a lode crossing side instead of end lines—is to relocate the claim. Some trial courts have decided that it was the surface ground staked that was located, instead of the lode, but it is safe to follow the application of the general principles of law in making locations.

THE copper ores of Rio Tinto, consisting of pyrite and chalcopyrite containing 2½% of copper, are roasted in piles in the open air. The roasted ore is then placed in large filtering basins constructed of masonry. These basins, 30 meters (98 feet) by 10 meters (33 feet) and 59 inches deep, have a false bottom of slightly inclined planks, so perforated that the liquid which filters through the mass can disappear under the false bottom, and from there through drainage sluices into the precipitating basins. The filtering liquid employed is water, which dissolves the copper in the form of copper sulphate. The washed ore is mixed with fresh ore and piled in heaps 3 to 4 meters (9.8 to 13 feet) high, through which apertures are made for the circulation of air. Oxidizing is again effected, the mass becomes warm, the sulphides and oxides of the first roasting become changed into sulphates, and at the end of six or eight weeks the mass is subjected to a second washing and leaching. The residue is again exposed to the air and leached, and so on during a period of two years. At the end of that time the ores are exhausted and contain but slight traces of copper. At Rio Tinto and Tharsis 500,000 tons of ore are constantly in treatment. The liquor charged with sulphate of copper is drawn into a series of canals in masonry, 600 meters (656 yards) long, at the bottom of which are placed bars of pig iron and old rails, which precipitate the copper as cement. After leaving the canals, the liquor, which contains then only a small amount of copper per cubic meter, is returned by pumps to the leaching vats, where it again serves as a solvent.

Genesis of Ore Deposits.

PART III.

Written for the MINING AND SCIENTIFIC PRESS by
MATT W. ALDERSON.

HOW TO TELL THE PROBABLE LIMITS OF ORE BODIES IN A MINE.—We have noticed certain peculiarities of streams and have found the indelible marks of stream action accompanying ore deposits, and come now to an observation of the valley itself in which the ore deposit was made. There are certain peculiarities about valleys common to many. Thus, if we drive across a typical valley (Fig. 3) we start on what is



FIG. 3.

called the first bench, then go down a decline to the main valley; then we go down again, across the stream and rise on the other side. If we approach a quartz vein as we would the crossing of a stream, we find all the peculiarities of present valleys duplicated.

Fig. 4 represents a true fault. There has been a



FIG. 4.

break in the formation and the ore enclosed by it and a shifting of the relative position the two sections originally held. Fig. 5 shows what is sometimes



FIG. 5.

erroneously called a fault, in reality a lapping of a shoot of ore deposited at one period over the edge of one deposited earlier, the first channel having been covered with sedimentary wash and a new channel having been made to one side and on a slightly higher elevation. It represents an actual situation in the Queen ledge, Granite county, Mont. Black in both these figures represents ore.

Fig. 6 is a representation of so-called faults found



FIG. 6.

at the head and foot of the Sherman incline in what is familiarly known as the Sunrise mine in Granite county, Mont. It is typical of what are frequently called faults in mines, but which are really not faults. There has been no break in the formation, no disturbance of the ore body. What seems to give color to the idea that these are real faults, oftentimes, is the fact that the ore is not in place in a uniform ore body on the face of one of these so-called "breaks" or faults, as it is in other places in the mine.

The mountain in which the Sunrise mine is situated was lifted slightly from the eastern side, tipping the ore body so that it dips to the west at an angle of about 20°. The mine is opened by a number of adits, the lowest being No. 3 west of discovery, which skirts for most of its length—several hundred feet—a so-called fault. An attempt to find pay ore still lower, at No. 4 west, resulted in failure. The showing of ore in No. 3 west was then taken up and followed down from the head of Sherman incline to level at foot. (See Fig. 6.) Some pay ore was found at

the foot of the Sherman incline and considerable work has been done in this section of the mine in an endeavor to find a permanent body of pay ore, but without success. From the point marked river bed in the valley in the direction opposite from the Sherman incline pay ore was found for a distance of several hundred feet. The illustration is given to make plain the fact that the limit of pay ore in any mine is the outer limit of the original valley in which the ore-bearing stream flowed. Not every mine will afford as clear an illustration, perhaps, as the one given herewith, but the practical mine superintendent can make a survey of his mine, taking the level of the ore bodies as they were originally laid down, and nothing gives this more truly in many mines than the smooth surface of the hanging wall, and if there is no mark

of the bench land outward from the side of an ore shoot there will be gradual elevations, which will mark the outward limit of the stream deposits and the limit of probable pay.

But there is something confirmatory of the rule laid down above. We notice the stream bed of gravel and we notice, also, that there are occasional thin layers of gravel in spots on the level of the bench, and that, in some instances, back near where the bench land rises to a higher bench or foothill, there is more gravel than elsewhere and the depression is greater. There is in this proof of the stream's having flowed back near the next bench longer than anywhere else except in and near the regular channel, and oftentimes the highest level of the bench is near where it slopes down to the stream. In like manner the ore is often found to be thin on the top of a bench near the main ore shoot, and thicker and of better grade back farther on the bench, as shown in Fig. 6. Further, the ore bodies on the benches will be more irregular in shape and their values more uncertain.

The character of the gold in the ore also indicates the position in the mine from which it comes. The ore in the main ore shoots of the Sunrise mine had an average assay value of over \$14, about \$10 of which were saved by amalgamation. The ore from the Sherman incline would hardly average \$5 and the millman would do well to make a saving of 25% on the plates, though ore of the same grade from the main vein would readily yield 50% by amalgamation. Ore in the Brother Jonathan mine, in Madison county, averaged \$12 in the main ore shoot and about 50% of this could be saved on the plates. The ore on the first bench, adjoining, seldom assayed to exceed \$2 and showed no free gold on pan tests. Where the stream flowed it would be natural to look for the greater precipitation. On the bench lands there would be only rainfall and standing and occasionally flowing water. The particles of gold in the bench deposits are lacking in thickness and appreciable size because they were not favored with sufficient quantity of mineral-bearing solution. This is the ore which must be worked by a wet process, even though ore in other parts of the mine may be made to yield a high extraction by amalgamation alone. In some of the mines of Butte we go down from 100 to 800 feet across the first bench of an ancient stream,

good showing of talc with a vein. It is a favorable sign, indicating, as it does, that the stream flowed quietly at such a place, as is proven by the deposition of such fine particles as talc is composed of—a condition favorable, as pointed out heretofore, to good precipitation of the precious metal contents of the stream. A better showing of talc will generally be found on one or both walls of the vein where the stream flowed longest. A smaller quantity is generally found with the bench deposits, and when found there it will be less compact and tenacious. The same is true of the talc in what are called the barren zones of a vein. Observation teaches us that in the course of time streams which cross valleys comparatively level do not always flow in the same place. In quartz veins we have separate shoots, made where the stream flowed at different times. Between these shoots will be places having less quartz, and that quartz will necessarily be of less value than the quartz on either side.

There are occasional islands in almost every stream. One must not mistake one of these for the limit of the ore body in that direction. It may be taken as such temporarily, till development in other parts of the mine determines its character.

The limit of pay ore in a mine in any given direction is the border of the valley in which the stream flowed which made the deposit. This may be a few feet or a few miles. If in the uplift which placed the vein in its present position the vein was set on end, the limit at the bottom will be where one encounters a true fault, a break in the formation, beyond which it may or may not be possible to take up the lost vein. Where on the sides the vein makes faults similar to those shown in Fig. 6, the intelligent miner will do sufficient work to determine his situation, but will not go on spending thousands of dollars in the belief that beyond such faults he will come into other shoots of good ore.

The writer's observations have led him to the conclusion that ore deposits have been lifted from the side more frequently than they have been set on end. But each mine must be read for itself, in the light of the knowledge that the ore was made by a flowing stream, on the surface of the earth, and that its formation is governed by the same laws as control all deposits of sedimentary character.

Comparative Tests of Fuel Oil and Coal.

Howard Stillman, mechanical engineer, who has made comparative tests of fuel oils and coal for the Southern Pacific Railroad, with which he is connected, reports the following data of evaporative tests made in locomotive service. The engines with which tests were made were of same size and make employed in passenger service:

	Petroleum.	Coal.
Miles run.....	224	224
Mean number of cars in train..	3.71	3.71
Weight of cars in train, tons..	113.01	110.40
Actual running time, hours...	7.55	7.63
Average steam pres're gauge, lb	133	130
Temperature of feed water, degrees Fahrenheit.....	660	660
Gallons water evaporated.....	6,603	5,980
Pounds water evaporated.....	55,025	49,833
Gallons oil burned.....	755	.....
Pounds fuel burned.....	6,040	8,043
Evaporation water per lb. fuel..	9.11	6.19
Evaporation from and at 412° F	19.96	7.41
Pounds fuel to evaporate one pound water from and at 212° F.....	.09124	.1349
Equivalent of fuels for equal evaporation, lb.....	1.00	1.48
Ditto, by measure.....	*168.9	**1
Gallons water evaporated per gallon of oil.....	8.75	.....
Miles run per ton.....	74.14	55.72
Fuel burned per hour.....	*100	**537
Total ton mileage.....	25.314	24.730
Ton miles per pound fuel.....	4.191	3.074
Ton miles per gallon oil.....	33.53	.....

* Gallons. ** Ton.

The above items are from record made with careful attention to weights and measures. Summerfield and Los Angeles petroleum and coal from Vancouver Island were the fuels compared. Proximate analyses of the Comax coal was:

	Per cent.
Moisture.....	1.90
Volatile combustible.....	27.08
Fixed carbon.....	55.38
Ash.....	12.50
Sulphur.....	3.14
Total.....	100.00

The fuel oil used ranged in gravity close to 16° Baume, with flash point about 240 F., and fire point 290° F. In practice it is taken at weight of eight pounds per gallon, though it varies somewhat in gravity. Fuel oils from the Kern, Los Angeles, Summerfield, McKittrick and other fields are represented by the figures given. They are dark brown or black, very heavy asphalt oils, very thick and viscid at temperatures below 60°, and can only be handled by use of steam-heating coils in tank or around pipes.

As to relative cost of either coal or oil fuel, the relative values are based on the figures from the above test for equal calorific effect from and at 212°; that is to say, 168.9 gallons oil equal one ton of coal.

The Formation of Bonanzas in the Upper Portions of Gold Veins.*

NUMBER III.

BY T. A. RICKARD.

THE DISTRIBUTION OF ORE-BONANZAS.—The shifting of the zone of oxidation is a principal factor in determining the distribution of rich ores. By the erosion of the superficial portions of the vein, in common with the enclosing rock, the further downward penetration of the oxidizing agencies is facilitated. The depression of the ground water level lowers the zone at which precipitation of gold, from descending surface waters, takes place, while, on the other hand, when a change in the hydrostatic level causes the ground water to rise, the zone of deposition moves up. In both cases the tendency is to give vertical extension to the rich mass of secondary gold ore, and thus to produce the occurrence which the miners term a "shoot."

Erosion is followed by another result, in itself of great importance to gold mining. The steady removal of the superficial part of the vein causes the lower portion, which has been enriched at or below the ground water level, to undergo a relative elevation by being brought nearer to the surface. In this way the bonanza zone, in process of time, may become the outcrop. This appears to me to explain the formation of the extraordinarily rich bunches of specimen quartz, such as made West Australia famous in 1894 and 1895, and started the mining stampedes of other days elsewhere. In many instances fortunes have been gathered almost at the grass roots from veins which, on systematic development, have proved unprofitable. The gold quartz veins of West Australia traversed rocks of great geological antiquity which have not, during late geological periods, undergone any notable disturbance. We do not know at what period the veins were formed; but, even though their formation dates no further back than the beginning of the Tertiary, they have since been continuously exposed to the same quiet forces of erosion which have leveled the region until it appears as an arid tableland strewn with the wreckage of geological time.

Whatever the alternations of slow depression and elevation which have affected this region, as part of a continental area, it is certain that erosion has been long at work with patient constancy. Throughout this period chemical agencies have been active in the zone of weathering, near the surface, removing the gold to the zone of precipitation, near the ground water. Whatever the slight changes which have marked the level of the ground water from time to time, erosion has continued uninterruptedly, and therefore it has steadily gained, with the result that the enriched portion of the vein has been brought nearer and nearer to the actual surface, until it finally appears as the outcrop which rewards the search of the prospector.

THE LOCALIZATION OF ORE SHOOTS.—To the miner the localization of these richer portions of the vein is of more immediate practical interest than the theory of their origin. A gold vein is not a homogeneous mass of auriferous quartz, of tabular form, penetrating the rocks like a sheet of paper, but rather as an irregular occurrence of ore, the composition and shape of which are very variable, because they are the result of chemical agencies and structural conditions of great complexity. While the traces of the agencies which precipitated the ore are obscure, because they have been largely obliterated by subsequent chemical action, the relation between the vein and its enclosing rock can often be traced by observation. In this direction the miner obtains great aid from the geologist. The transactions of this Institute and the publications of the U. S. Geological Survey contain numerous clear expositions of such structural relations. The monographs on the Leadville and Eureka mining districts may be especially instanced as affording striking examples of the direct application of geology to underground work.

AUSTRALIA.—One of the best examples of the localization of rich ore came under my notice in 1890 in the Bright mining district. Bright is geographically in the Australian Alps, and geologically in the Upper Silurian slates and sandstones. Though these rocks have undergone metamorphism, and exhibit a well-developed cleavage, yet their bedding has not been obliterated. The veins cross the bedding planes of the enclosing country both in strike and dip. When investigating the distribution of the ore in the mines of this district, I found that the ore shoots had a pitch corresponding with the line of intersection between vein and country. This was well illustrated at the Shouldn't Wonder mine, 7 miles from the town of Bright. The lode was a simple quartz vein from 15 to 24 inches wide, carrying a small percentage of pyrite. It had a strike of N. 28° W. of N. and a dip to the N. E. of about 75°, while the country dipped S. W. 79° and had a strike of N. 55° W. The plane of the vein cut across the beds of the country and the intersections thus produced were to be seen along the foot wall of the lode as lines, pitching 42° to

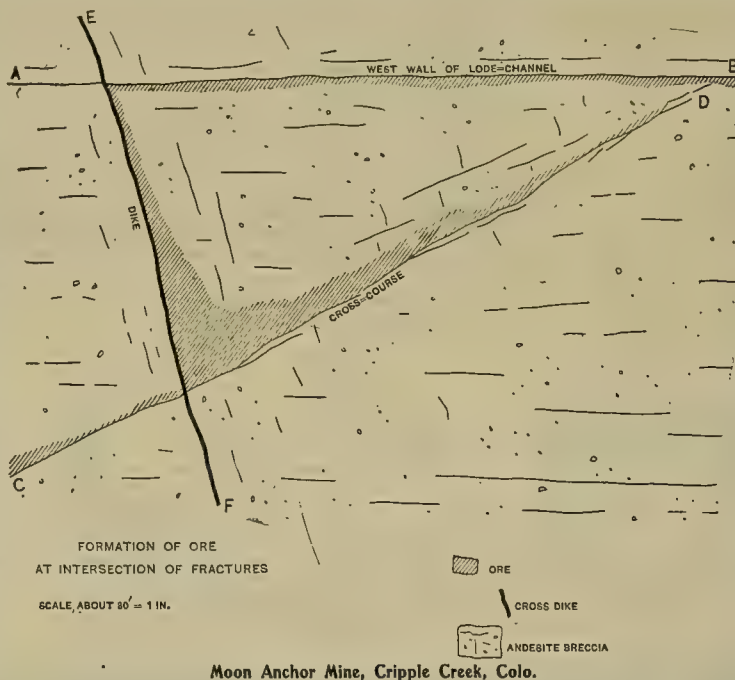
46° southward. While the foot wall was more regular than the hanging, and therefore exhibited this feature best, yet the hanging also carried lines corresponding with those on the opposite wall.

The boundaries of the ore shoots in the mine followed these lines; and the longitudinal section of the workings, as seen on the mine maps, proved also that these lines of intersection had an inclination which coincided with the trend of the ore bodies, as stopped out between the four successive upper levels of the property.

At the Myrtle mine, in the same district, there was the same correlation between the pitch of the ore bodies and the line of intersection of the wall of the lode with the bedding planes of the enclosing country. The stratification was distinct, the rocks consisting of altered, silicified slates of a gray to gray-blue tint. In the stopes above the 700-foot level the pay ore was separated from the normal valueless quartz of the lode by a small step, due to the irregular fracture of the vein in crossing two beds of unequal hardness. It marked the line of intersection between lode plane and country bedding, and also proved to be the boundary of the pay shoot. In the different portions of the mine the variation in the dip of the country produced variations in the angle of the lines of intersection, and also in the pitch of the ore shoots.

It is not often that the formation traversed by a vein has such a simple structure as was presented by these Silurian sedimentary rocks; but it is probable that in other districts also the pitch of the ore bodies may have been determined by structural conditions of a similar kind, which have been obscured, however, by metamorphism.

COLORADO.—Experience has shown that the intersection of fractures favors the occurrence of rich ore bodies. An interesting example was afforded by the Moon-Anchor mine, at Cripple Creek, in 1899. This is illustrated in Fig. 1. The ore in the mine occurs



in a lode channel marked by a band of fractured andesite breccia. At the 400-foot level a small dike (EF) of granite, 2 to 6 inches thick, intersects the lode channel at a place where a counter fracture (CD) also traverses it. A triangle is produced by these intersections, and the ore is proved to surround a block of ground which is also mineralized, but not sufficiently so to be regarded in its entirety as pay ore. At the crossing of the dike and cross-fractures a very rich body of telluride ore was encountered.

This reminds me of the Yankee Girl ore body, mentioned by Emmons. This body of ore was of phenomenal richness, many ten-ton lots being shipped which carried seven or eight ounces of gold and 3000 to 4000 ounces of silver per ton. The ore was also rendered remarkable by carrying the rare mineral stromeyerite, a sulphide of silver and copper. Mr. Emmons speaks of the bonanza turning into low-grade pyritic ore as depth was attained. I may add that this change was not gradual, but sudden, and coincident with certain structural relations. At the surface, the vein consisted of comparatively low-grade ore, which led to the finding of a nearly vertical "chimney," averaging only 25 to 30 feet in diameter, of extraordinarily rich ore, consisting of the copper sulphides, bornite and erubescite, with stromeyerite and barite. The gold in the ore was associated with the barite. From the second to the sixth level, at about 500 feet below the surface, this bonanza proved immensely productive; then, suddenly, a flat floor, dipping west and accompanied by clay, crossed the deposit. This flat vein was worked for 90 feet, from the south drift at the No. 6 level, and contained ore similar to that of the Yankee Girl chimney. The

latter was found again deeper down, and out of its former line of descent, but it was much diminished in richness, and appeared to merge into the general body of low-grade copper and iron pyrites which characterized the lode at the tenth level. This mine and its neighbors, the Robinson and Guston, are idle now. They are in the andesite breccia of the San Juan region. The Yankee Girl chimney was situated, I believe, at the crossing of three lode fractures, appearing as brakes in the andesite, which was bleached and mineralized where they traversed it. It was a curious feature of this mine, and of the Guston also, that the short, very rich bonanzas of the upper levels gradually lost their definition, that is to say, they became no richer than the intervening portions of the lode. This was interpreted as a "lengthening" of the ore shoots, which may be true, viewed in one way; but I think that it should be more properly regarded as an impoverishment of the lode, marked by a disappearance of the bonanzas. The surface waters of these mines are very acid, Mr. Emmons remarks. At the Yankee Girl mine it became necessary to encase the pipes in redwood, brought from California. I found that the water issuing from a shallow adit (73 feet below the collar of the shaft) readily precipitated copper on scrap iron. Ore forming agencies were evidently still at work.

(TO BE CONTINUED.)

The Lightner Chlorination Mill, Angels, Cal.*

Written for the MINING AND SCIENTIFIC PRESS.

The Lightner chlorination mill, recently completed and started operating, is a very complete and up-to-date plant. It is situated adjacent to the Lightner mine. The building is 48x185 feet. The floors are made of concrete. The sulphurets floor is elevated to the level of the hearths of the roasting furnaces.

The cooling floor is 18 inches below the hearth level, and the leaching tubs are set on a floor 40 inches below the cooling floor, thus avoiding the elevation of the sulphurets at any stage of the process. Below the leaching floor there is an intermediate floor which is used for the solution tanks. The precipitating floor there are two drains, each 4x4 inches, running into an outside tank, which is used as a filter. After passing through this filter the solution is run into a large settling vat, the method employed effecting a very perfect saving.

The stack is 60 feet high, with two compartments, providing in advance for a second roasting furnace. The furnace is 12x87 feet by 7 feet outside, and the fumes pass from it into a dust chamber, which has four quarter turns. Owing to the scarcity of surface water the mine water is pumped to the plant, a distance of 1500 feet, by a triple-plunger pump, having a capacity of 3000 gallons

per hour. The water from the mine has been found by experience to give a more satisfactory extraction than surface water. The operation of the plant requires the services of six men.

A tramway is being built to convey the sulphurets from the stamp mill to the chlorination plant. Electricity will be used to operate it. The capacity of the plant is five and one-half tons every twenty-four hours.

*See illustrations front page.

New White Lead Process.

The new process is the invention of J. W. Bailey. Its product, as in the old Dutch process, is carbonate of lead. The only material difference between the two processes is that, when the new treatment is ended, the blue lead is entirely corroded, five days only having been consumed in the process and no crystallization has occurred. The pig lead is melted exactly as in the old process. It is driven from the melting pot by the force of its own gravity through a short horizontal nozzle, as in the former case; but, instead of running out into the waffle-shaped buckles, it is forced through a thin steel plate, in which the horizontal nozzle is made to terminate, the steel plate being perforated with about 200 minute holes not more than $\frac{1}{16}$ of an inch in diameter.

There thus falls into the air, cooling immediately, fine metallic fiber which, dropping upon trays holding about fifty pounds of fiber, permits free circulation through the entire masses, which are passed swiftly through an 8% solution of acetic acid and then stacked. The entire process is mechanical and auto-

*Trans. Am. Inst. M. E., Richmond meeting, February, 1901.

matic, effecting a great saving of hand labor. The carbon dioxide has to operate upon a minute lead fiber instead of upon a large, thick buckle. Practically, the exposed lead is all surface. Every particle is reached by the gas immediately, and in four or five days it has been entirely corroded. There is no blue lead remaining, and the further process or separation by which under the old method the crystallized particles must be removed, is unnecessary. Under the most careful microscopic examination, nothing is disclosed in the Bailey process except pure white lead and that 2% or 2½% of water which is a necessary ingredient of the best white lead product.

The economics thus accomplished are enormous. The total cost of manufacture by the Dutch lead process averages from \$13 to \$18 per ton of dry product. The new process averages something less than \$5.—The Lead and Zinc News.

Mining and Metallurgical Patents.

Patents Issued July 9, 1901.

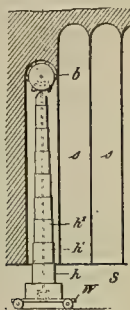
Specially Prepared for the MINING AND SCIENTIFIC PRESS.

PROCESS OF MINING COAL.—No. 677,880; E. C. Morgan, Chicago, Ill.



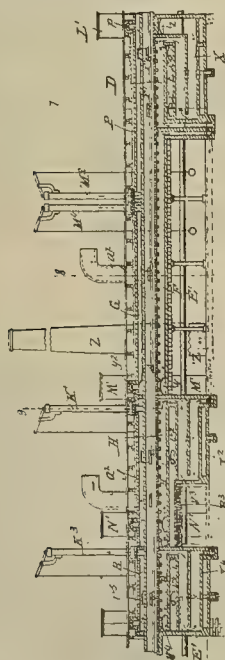
The process consisting in blocking out in coal vein a sufficient amount of coal to fill a car, by forming horizontal and vertical kerfs, then running a movable platform or car under blocked out coal, loosening it and letting it down directly into movable platform or car.

MINING MACHINE.—No. 678,045; W. Seltner, Schlan, Austria-Hungary.



A movable platform, a telescoping cylinder, a telescoping rotatable pole or rod, carried by telescoping cylinder, a cutter head carried by pole or rod and geared thereto, means for rotating telescoping cylinder for projecting and retracting pole or rod with cutter head, and means for rotating pole or rod to operate cutter head.

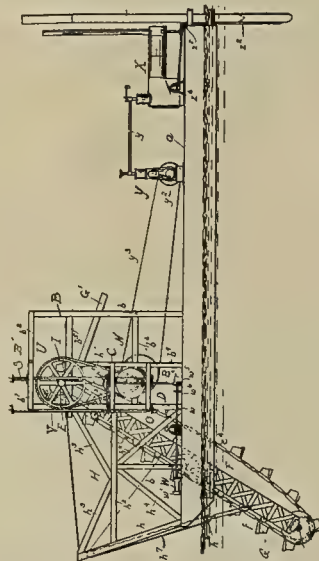
APPARATUS FOR DESULPHURIZING ORES OR OTHER SUBSTANCES.—No. 678,078; J. P. Wetherill, South Bethlehem, Pa.



The method of roasting by furnace heat a progressively moving or advancing charge of ore containing sulphur, which consists in excluding products of combustion of heating furnace, admitting air at an initial portion of ore and partially oxidizing sulphur

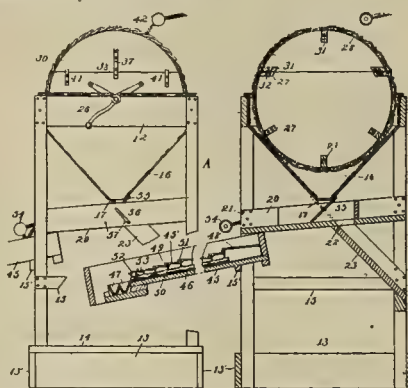
thereby, maintaining roasting temperature along an advance portion of charge by combustion of sulphur, withdrawing sulphur fumes at advanced portion so as to prevent them from passing on over remainder of the ore, and finally admitting sectional quantities of air to oxidize the sulphur in portions of charge still further advanced.

MINING DREDGE.—No. 678,147; W. T. Urie, Kansas City, Mo.



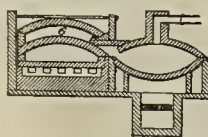
A dredge boat, and alternating cable winding and unwinding drums thereon, and separate cables having free ends extending in opposite directions and laterally from forward end of dredge boat, and connected with suitable fixed points, separate vertically-movable boat-anchoring spuds or spars connected with rear end of dredge boat and adapted to be lowered in position alternately, a main power shaft, and an engine and its driving shaft, power conveying devices connected with driving shaft of engine and main power shaft; a separate, horizontal shaft upon boat, actuated by main power shaft and a vertical power-transmitting shaft connected with and actuating drums carrying cables, and friction gear connecting horizontal and vertical power-transmitting shafts.

AMALGAMATING APPARATUS.—No. 678,183; A. H. Jocelyn, Brooklyn, N. Y.



A framework; an inclined, shiftable trough carried thereby and having a pair of discharge mouths and shiftable to deflect material discharged therein into opposite direction; a removable hopper carried by framework and having a discharge mouth at lower end opening above shiftable trough intermediate discharge mouths thereof; a rotary drum supported by framework for rotation in hopper, and comprising a pair of end walls, a series of radially-extending apertured crossbars connecting end walls, shiftable cover and differential mesh screen periphery, mesh being larger at exterior than at interior; and a water-discharge conduit above drum and in position to discharge into drum during rotation.

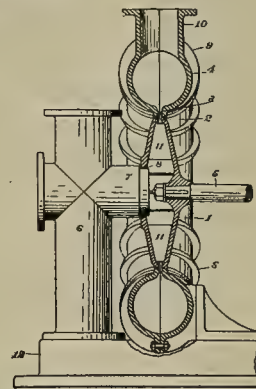
PROCESS OF TREATING COMPLEX ORES.—No. 678,210; J. W. Worsey, St. Helen's, England.



Process for the treatment of complex sulphide ores comprising first reduction of combined sulphur below 15% by calcination; secondly, finely powdering calcined ore; thirdly, adding sodium nitrate; fourthly, boiling mixed ore and nitrate in dilute sulphuric acid; fifthly, roasting semi-solid mass in a closed furnace; sixthly, dissolving out zinc, copper and other soluble salts from mass by weak sodium-sulphate solution;

seventhly, removing any copper from solution; eighthly, precipitating zinc and other metals from solution; ninthly, separating zinc.

CENTRIFUGAL PUMP.—No. 678,198; J. Richards, San Francisco, Cal.



An annular discharge chamber, an uninclosed rotary disk impeller mounted concentrically therein, divergent vanes with impeller forming between them passages expanding toward periphery in plane of rotation, vanes terminating a short distance within periphery of impeller to form an annular continuous discharge way at margin thereof, and continuous annular throatway on surrounding discharge chamber co-operating with discharge way.

Wet Extraction of Copper.*

By C. C. LONGBRIDGE.

This method is applied to: (1) Ores that are too poor to smelt, under favorable conditions, to ores with as little as 1% to 1½% of copper; and (2) products containing copper, silver and gold.

The ores amenable to wet treatment include: (a) Copper in the form of oxide, carbonate, sulphate and phosphite, or arseniate, can be dissolved by cheap solvents, such as ferric sulphate. (b) Copper in the form of sulphide, admitting very slow and imperfect extraction by cheap solvents, has first to be converted into a sulphate or a chloride, soluble by cheap solvents, such as water, hydrochloric or sulphuric acid, or metallic chlorides.

In all cases the copper is precipitated, as metallic copper, by means of iron; or exceptionally as sulphide by sulphuretted hydrogen; or as hydrated oxide, by suboxide. The iron is usually metallic, wrought iron, pig iron, sponge iron, bears, etc. Tin-plate clippings also can be used; if the copper is in solution as chloride, the tin can be separated as oxide.

(1) Dealing with the above more in detail, it may be said that for ores containing oxide or carbonate of copper, such as ores of cupric oxide, azurite, malachite, arseniate of copper, the solvents used are sulphuric acid, hydrochloric acid or ferrous chloride. The two former are very energetic, and, if low in price, should be used in preference to the slower ferrous chloride.

A necessary condition for the employment of acids is that the ores should not contain notable quantities of other bodies, especially carbonates, soluble in acids. Carbonates, other than those of copper, are prejudicial also to the use of ferrous chloride. Regarding the action of these various solvents it is noteworthy that:

(a) Sulphuric acid readily dissolves cupric oxide, azurite, malachite and arseniate of copper; somewhat less readily, phosphate of copper. The acid is applied as such, or as sulphur dioxide, nitrous fumes and water vapor.

(b) Hydrochloric acid is preferable to sulphuric acid, as it is less liable to form basic salts. The solutions, therefore, contain little free acid, and thus require less iron to precipitate the copper than solutions containing sulphate of iron. On the other hand, hydrochloric acid attacks oxide of iron more energetically, and, accordingly, is less suited for treating ores with much ferrous oxide.

(c) Ferrous chloride is suitable for cupric oxide or copper carbonates; cuprous oxide may be treated, if first converted into cupric oxide by ignition in the presence of air. The original Hunt-Douglas process has been modified by dissolving the copper by dilute sulphuric acid, and then adding ferrous or calcic chloride to the solution. This method has the advantage that ferric hydrate is not formed, nor is silver dissolved by the weak sulphuric acid, and the copper precipitation requires little iron.

(d) Ferric sulphate may be used in combination with sulphuric acid.

(2) For ores, mine water, etc., containing copper as sulphate, the copper is precipitated from solution by iron. Sulphuretted hydrogen may be used, when iron is not obtainable. The precipitated (cemented)

*Trans. Institution of Mining Engineers, London and Newcastle-upon-Tyne Dec., 1900, meeting.

copper, sulphide of copper, is dried in filter presses, and either roasted in the English reverberatory or converted by hot-air blast into oxide, and then smelted for coarse copper.

(3) For ores containing copper as sulphide, the first operation is to convert this into soluble sulphate, or oxide, or chloride. The first transformation is effected:

(a) By weathering, without calcination. This natural oxidation is prompted by repeated leaching, pouring over the heaps the acid ferric-sulphate liquors, left when the copper is cemented. Generally several years are needed to obtain even a moderate proportion of copper in the form of sulphate. The extraction is somewhat imperfect and capital is locked up for a long time.

(b) By slow calcination. Such calcination requires the ore to contain proportionately large amounts of iron pyrites and small amounts of copper pyrites. After calcination and leaching, the heap is allowed to weather, so as to convert the residue into sulphate. If the ores are free from gangue, do not decrepitate, and have sufficient copper, the roasting is so conducted as to concentrate the copper sulphide in a kernel, while the sulphate remains in the porous crust, consisting chiefly of iron oxide, and is leached out. The kernels are smelted.

(c) By calcination with sulphate of iron or other easily decomposed sulphates, such as sulphate of alumina, thus converting the greater part of the copper into sulphate. The calcination is done in heaps. The ore, say, a poor copper pyrites, is crushed fine, made into a stiff paste with cementation liquors containing sulphate of iron, molded into bricks, dried and built up into heaps. The leaching is done with cementation liquors from which the copper has been precipitated.

(d) By treating the ore with nitrate of iron (Perrino process).

(e) By treating the ore with ferric-sulphate solution—a method proposed for decomposing sulphide of copper for electrolytic extraction.

The second conversion, namely, the transformation of copper sulphide into oxide, is effected by calcining the crushed ore.

The third change, namely, the conversion of sulphide into chloride, is effected in the wet way, by treating the ore either with ferric or ferrous chloride and hydrochloric acid. The process is slow, and advisable only when fuel is dear, or the fumes of a chloridizing roast cannot be allowed to escape into the air. The conversion of copper sulphide into chloride by ferric chloride is applied at Rio Tinto to cupriferous pyrites, with about 2.68% of copper, and is there known as the Doetsch process. The result is cupric and cuprous chloride dissolved in ferrous chloride, and ferric chloride. After precipitation by iron, the ferric chloride is regenerated by iron. About 1.34% of the copper is converted into chloride and leached out in four months. Of the rest, 0.86% of copper is extracted in two years more, and the residual 0.48% of copper is lost. Attempts have been made at Rio Tinto to shorten the chlorination by first digesting the ore with ferric chloride in vessels, and then treating it in heaps. As the Doetsch process only slightly attacks iron pyrites, the leached ore can still be used for sulphuric acid manufacture. In dry chlorination, the calcination should be conducted so as to produce the minimum of copper oxide and cuprous chloride, as these, being insoluble in water, require to be leached by acids. The necessary conditions for this method are that the sulphur does not exceed $1\frac{1}{2}$ times the equivalent of copper present, otherwise too much salt must be used and the calcination too much prolonged. Again, the ore must not contain more than 6% to 8% of copper, otherwise the whole of the sulphide will not be decomposed. Lastly, the temperature must not exceed low redness, otherwise too much cupric chloride would be volatilized.

COPPER ORES are not treated by the wet method in Tasmania, nor concentrated previous to smelting. The principal smelter is at Queenstown, belonging to the Mount Lyell Co., where copper ores, averaging 2.48% copper, 1.95 ounces silver and 0.074 ounce gold per ton, are treated by the pyritic smelting method. Two sets of furnaces are in blast, one comprising six, the newer addition five. The size of the second nest of furnaces is large for copper smelting, viz., 210 inches by 42 inches in the clear of the hearth; the height from tapping floor to charging floor, 20 feet; the number of tuyeres, forty. The blast is heated by four hot-blast stoves, in two sets. The power blast consists of six boilers of 125 H. H. each and five vertical compound condensing engines, each coupled direct by a flexible coupling to a No. 8 Roots blower. The disposal of slag is conducted by means of granulation.

An Appreciated Testimonial.

This paper is in constant receipt of kindly expressions from its patrons as to the value to them of their advertisements. The readers of this paper have bought mining machinery and supplies to the extent of over \$150,000,000 in the last ten years, and their annual purchases now approximate \$20,000,000. Its advertising pages are referred to everywhere by intending purchasers of mining machinery or supplies

as a directory for that purpose, and advertisers everywhere find an advertisement in its columns not an experiment but a paying investment; for, in advertising, it is results that count. It is not what an advertisement costs, but what it produces, that determines its value. Some time ago Mr. Chas. F. Hendrie, of the Hendrie & Bolthoff Manufacturing & Supply Co. of Denver, Colo., gave the publisher of this paper the subjoined, an unsolicited testimonial, which is prized. Mr. Hendrie's kindly expression of fact is herewith reproduced:



Denver, Colo. April 19, 1901.

Mr. J. F. Halloran,

Publisher Mining & Scientific Press,

San Francisco, Calif.

Dear Sir:—

I think it is but due to the Mining & Scientific Press to briefly express our appreciation of the value to us of the advertisement in your paper. We know from our own knowledge that the results are largely due to the class of subscribers to whom your paper is mailed, and we want further to state that your continuous efforts to secure subscribers rather than advertisers, is one which should meet the approval of advertisers.

We have had excellent results from our advertising, and in increasing the space do so because it pays.

Yours very truly,

The Hendrie & Bolthoff Mfg. and Supply Co.,

By *Chas. F. Hendrie Treasurer*

Electro-Vapor Launches.

Considering the almost unlimited possibilities furnished by the inland and coastwise waters of North America for the use of light craft, either for pleasure or profit, and the rapid progress that has been made in the construction of light and powerful motors during the decade just passed, the evolution of the staunch, graceful and swift gasoline launch comes in natural sequence. The accompanying picture shows a 28-foot-cabin launch now in use on St. Andrews bay,

Florida. These launches are extensively used, both for outing and business purposes, not only in the United States, but in many other parts of the world. They are built of best selected material, and are considered reliable. The electric-vapor engine built by this company is a special feature, durable, compact and simple and economical in operation. The boats range from 15 to 50 feet in length, the prices varying with size and general style of finish. Baker & Hamilton, San Francisco, are the sole agents for the sale of these launches in California and the Orient, and carry them in stock for immediate shipment.



Electro-Vapor Launch.

MINING SUMMARY.

Specially compiled and reported for the
MINING AND SCIENTIFIC PRESS.

CALIFORNIA.

ALPINE COUNTY.

A test run on 500 tons of ore from the Lewis mine at Gardnerville was so satisfactory that arrangements are now being made to increase the number of stamps to twenty. A contract has been let to get out 500 cords of wood.

CALAVERAS COUNTY.

The Beatrice mine, formerly owned by T. J. Matteson and J. E. Matteson of Murphys has begun operations. A Morgan is Supt.

EL DORADO COUNTY.

A. Lauer has discovered what he claims is tin near Michigan Flat, and says that the deposit, which is rich, is so large that many years would be required to work it out.

INYO COUNTY.

The Reward G. M. Co. at Independence are investigating the mountain streams to find a water supply and site for an electric power plant.

KERN COUNTY.

Rich ore has been struck in the Trilby mine, Yellow Aster group, at a depth of 1120 feet.

The 30-stamp mill of the Yellow Aster Co., which has been shut down for repairs, has been started up again. The condition of the mine and the facilities for getting ore to the mills is considered such that 500 tons of ore daily can be supplied to the two mills.

MONO COUNTY.

The South End Tailings Co. has bought ten stamps at Mammoth from J. S. Cain and will build with them a custom mill at Bodie adjacent to the company's cyanide plant.

NEVADA COUNTY.

H. Diener, manager of the Daylight mine near Maybert, is preparing to start the mill. A flume 2000 feet long has been built to bring power to it. The ledge is about 2 feet in width and the ores prospect well.

W. Tiernan and H. Diener are developing the Gray Eagle mine at Maybert. It is proposed to erect a new 10-stamp mill on it.

C. J. Schuster, the superintendent of the Grizzly Ridge mine, purchased the Live Oak and Minnett mining claims, at Columbia Hill. A 10-stamp mill is part of the property bought. It is reported that a large chlorination plant will be erected on the Live Oak property.

The Jenny Lind G. M. Co. has bought the pipe line of the Murchie mine at Nevada City, which will be moved to the Jenny Lind mine at Grass Valley and used as part of the power plant to run the new mill.

The Tule Belle mine, at Grass Valley, is being reopened. A new hoisting rig and a new engine have been installed. A shaft is 180 feet deep and sinking will be resumed. The mine is owned by Grass Valley people.

At the Lecompton mine, Nevada City, steady production is kept up. Twelve tons of smelting ore shipped produced \$2400. The incline is being sunk and is now down about 300 feet.

Supt. C. Graham of the Bellfountain mine in Willow valley, near Nevada City, says that the water has all been pumped out of the incline shaft. Sinking has been recommenced at the 350-foot level and will be continued to the 450-foot level.

At the Mistletoe mine at Rough and Ready sinking is being continued. Some fine ore has been taken out of the mine in the upper levels. The rock is heavily mineralized and much of it has to be worked by smelting.

Work at the Pennsylvania mine is suspended until the decision in the suit with the Grass Valley Exploration Co. is rendered by Judge Morrow. About seventy men had been employed.

SAN LUIS OBISPO COUNTY.

A streak in the 80-foot vein of cinnabar ore in the Rinconada quicksilver mine, near Santa Margarita, has been struck. The ore is thought to carry about 1% quicksilver.

SHASTA COUNTY.

J. O. Welsh of Mott, Siskiyou county, has bonded the Live Oak mine, near Shasta, to Shasta miners, who will ship ore to the Keswick smelter.

W. Arps of Copper City has bonded the Red Cloud and Ontario copper prospects in Copper City district from M. Renaud until July 2, 1902, obligating himself to prosecute development work on the property.

F. E. Ware, general superintendent of the Mount Shasta Mines Co., says the company are negotiating to buy more

land adjoining their property near Shasta. They have bought from J. Kahny, D. Lees and others a quarter interest in 120 acres of land on Clear creek. It is said the company desire these properties to put in a power plant on Clear creek to furnish power for the mill and machinery to be installed at the Mount Shasta mine.

The Clipper mine on Squaw creek, near Kennett, owned by A. Di Nola of San Francisco, is to be reopened immediately. The property has been shut down by litigation. J. H. Walkotte will be the foreman. The old workings will be cleared out and re-timbered.

SIERRA COUNTY.

J. W. Belcher and other San Francisco parties owning the Towle mining property on the Monte Cristo ridge, near Fir Cap, have resumed operations.

SISKIYOU COUNTY.

The King Solomon mine of the South Fork of Salmon river, Cecilville, operated by J. A. Thompson, is running steadily.

TUOLUMNE COUNTY.

L. Chappelle, Supt. of the Mohican M. Co. at Carters, says the company will erect a 5-stamp mill, the contract having been let. It will be run with a gasoline engine.

The Longfellow mine, near Sonora, is closed down and the pumps have been taken out. The Nonpareil mine, belonging to the same company, is being operated.

J. H. Rogers of Carters reports that he and his partner have bonded to C. D. Lane the Fleming mines, situated on the line of Mariposa and Tuolumne counties. Operations will be commenced on the property in September.

The Jones mine, situated near the Shawmut, is shut down at present, but the company which has bought the property will, it is said, soon start work on a large scale and put up a mill.

COLORADO.

CLEAR CREEK COUNTY.

The Denver & Salt Lake Railway, Tunnel & M. Co., capital \$5,000,000, has incorporated to tunnel under Argentine Pass. The incorporators are: H. W. Hannum, J. J. Reilly, L. N. Collis and D. J. Kelley, of Denver, Colo., and J. E. Ratchford of Syracuse, N. Y. Other New York State capital is also interested, and the objects of the company are to build a railroad through Clear Creek and Summit counties, and do a general mining business in the same locality.

J. Carozza, W. T. Jacoby, H. Kneisel, R. M. Stearns and R. M. Richardson have incorporated the General Hooker T. & M. Co., with capital stock \$1,000,000, to operate the old Pickwick properties on Saxon mountain, Georgetown. The Pickwick in the early days produced a large amount of high-grade ore.

E. F. Welles, manager for an Eastern company, has commenced work on the well known Conqueror, at Empire.

FREMONT COUNTY.

The United States R. & R. Co., it is said, will commence shortly to concentrate the huge dump of tailings at the Metallic Reduction Works at Cyanide. It is estimated that there are fully 750,000 tons of tailings of average value of \$2 a ton. A big concentrating plant is to be constructed, work on it to start at once.

HINSDALE COUNTY.

L. Le Fevre of Lake City has bonded the Macaboy and Denver lodes at Silverton to R. V. Hopkins at \$13,000, until January 1, 1903.

LAKE COUNTY.

The La Plata G. M. & M. Co., organized to operate the Mountain Quail group on Mount Estabrook, Twin Lakes, near Leadville, has begun work; A. J. Stanley of Colorado Springs, manager. The incorporators are J. F. Murray, I. E. Townsend, A. D. McKay, J. Watts and a Mr. Thomas, all of Colorado City.

A shipment of ore has been made from the President mine, on Brece hill, Leadville. The sampling indicated five ounces gold and 28% bismuth, giving the ore a value of about \$600 per ton. The bismuth is figured at \$28 per unit, the price heretofore, but quotations are stated now to be \$10.

A 6-foot vein of low-grade magnetic iron and gold-bearing honeycomb quartz has been discovered on the summit of Prospect mountain in claims owned by the Mansfield Brothers of Leadville.

MINERAL COUNTY.

Creede shipped 6194 tons of ore during June. The Holy Moses has resumed shipments for the first time since 1895. The Ethel mine is handling 40 to 50 tons of zinc and lead base ore daily.

OURAY COUNTY.

The Micky Breen mine and mill at Ouray have started up after being closed down since 1893.

D. Sullivan has bonded the El Mahdi,

and, it is said, proposes to expend \$20,000 in equipping and developing the property.

N. West has contracted to build a mill on Canyon creek, near Ouray, to work the tailings of the Camp Bird and other mines. It is claimed that a valuable waste flows down the creek from these mines that will be recovered by this mill.

SAGUACHE COUNTY.

A strike is reported to have been made in the Crestone district upon the Copper King group, owned by J. D. O'Brien and J. W. Davies. A 5-inch streak of high-grade copper ore has widened to 16 inches and runs 30% copper and \$11 gold.

SUMMIT COUNTY.

The Gold Run M. & M. Co., at Breckenridge, is constructing a power line, and the machinery, power and light will be supplied by electricity. Col. Lightburn of Cripple Creek is manager.

TELLER COUNTY.

Ore has been discovered in the Last Dollar at a depth of 1150 feet. Values are sufficient to satisfy the management of the existence of pay ore at that depth.

The Dexter Co., at Cripple Creek, has decided to do the work of exploration itself, commencing on block No. 1, where the last lessees sunk the shaft to 300 feet. The company will make the shaft 500 feet deep, crosscut to the vein and drift to blocks Nos. 2 and 3.

The Independence Con. M. Co. has granted King & Whiting a new lease on their block. The shaft, now down 700 feet, is to be continued to the 800-foot point.

A. J. & T. Finnerty of Cripple Creek have taken an eighteen-months' lease on the St. Thomas G. M. Co.'s property on Beacon hill. The lease requires seventy-five shifts a month, 25% royalties and 50 feet of continuous sinking.

A record-breaking speed is claimed in timbering the shaft of the Legal Tender mine. The timbermen have retimbered to a depth of 300 feet in a little over seven days.

A discovery of quicksilver is reported in the Oil creek region of the Cripple Creek district; whether of commercial value or not is yet to be determined.

IDAHO.

The Northern Star M. Co. has incorporated, to operate mines in Idaho, with an office in Spokane, Wash., and another at Indianapolis, Ind.; capital, \$1,000,000; trustees—H. D. Yoder, H. S. Rominger and G. S. Warren of Indianapolis, Ind.; F. Chestman of Greenburg, Ind., and W. H. Plummer of Spokane, Wash.

BANNOCK COUNTY.

The Pittsburg G. M. Co., S. F. Hunt manager, at Soda Springs, has contracted for the erection at once of a quartz mill of fifty tons daily capacity.

The gold mines of M. Mahnken and his associates at Soda Springs are to have a 10-stamp mill, with foundation for such additions as may later be required.

BLAINE COUNTY.

A strike has been made near Martin of a ledge from 12 to 20 feet in width, the croppings of which are said to prospect for a distance of 1600 feet in free gold, much of it coarse.

IDAHO COUNTY.

The Midas G. M. Co. has explored the Ajax property at Grangeville and is reported to be waiting the construction of a mill, to be installed as soon as possible. One of the ore shoots is said to be from 4 to 20 feet wide and to have an average value of about \$22 per ton.

The Wilkinson strike at Pierce City is proving richer than at first supposed. Test pits dug, exposing the vein for nearly 200 feet, show it to be from 10 inches to 3 feet in width and very rich in free gold.

W. A. Stevens, foreman of the mining syndicate's operations at Buffalo Hump, states that there are now twenty men employed in the Vesuvius, and that the best present showing is in the Jumbo, which has a large body of ore with values ranging from \$28 to \$30 a ton.

LEMHI COUNTY.

The bond on the Chicago and W. J. Bryan lodes, in the Blackbird district, held by the Franklin Syndicate, has been taken up by the payment of \$21,000. The new owners say that at 300 feet the value and extent of the ore bodies are highly encouraging. Mr. Fitzwater is Supt.

OWYHEE COUNTY.

R. Noble and his partner have found a ledge 8 feet wide and ore that runs over \$100 a ton near Silver City.

SHOSHONE COUNTY.

A. Andrieux has located a group of claims near Mullan. He has nine claims in all, covering all the ground on which the croppings could be found. He describes the vein as showing from 75 to 100 feet wide, and for about 1500 feet good ore

can be found. He has had a number of assays yielding from 5% to 17% copper, eight to fifteen ounces silver and about \$4 gold. A tunnel has been run about 40 feet, all in ore, and some shallow shafts have been sunk on it.

The Chloride Queen Co., at Wardner, have a 500-foot contract on their lower tunnel, half of which will be drifting on the vein.

The Pawhatton M. Co. has resumed work on its mine near Wardner, a contract for an extension of the tunnel having been let.

WASHINGTON COUNTY.

W. Sweet, representing Boston people, has bought the Missouri group of mines in the Thunder Mountain district for, it has been stated, \$50,000.

MONTANA.

BEAVERHEAD COUNTY.

The Polaris M. Co. has incorporated, with J. E. Rickards, J. MacGinnis, A. H. Wetthey, G. H. Robinson, A. J. Huenke, J. K. Heyset and W. C. Jones as directors; capital, \$250,000. The company will operate the Polaris mine.

Judge Dennis of Dillon is operating the Indian Queen mine on Birch creek, doing development work for Eastern people, who have a bond on the property.

BROADWATER COUNTY.

J. Keating of Radersburg, operating one of the old mines there, is now shipping base ore and concentrates to the smelter. He contemplates the erection of a cyanide mill to treat the latter.

A consolidation of all of the properties in the Neihart district owned by L. S. McLure is made by the St. Louis & Montana Co. Included in the consolidation are the Broadwater mines and the Diamond R. Con. Co.

FERGUS COUNTY.

A. J. Schumaker, of Butte, is bonding copper prospects on Wolf creek. It is said to be his intention to organize a company to build a smelter and work the mines.

FLATHEAD COUNTY.

J. H. Geiger of Libby has organized the Illinois & Montana G. M. Co., capital \$1,000,000, to develop the claims owned by the company and to equip them with machinery. The claims bought by the company are in Fourth of July gulch in the West Fisher district, 40 miles south of Libby. It is the intention of the company to erect a 10-stamp mill. The ore is estimated to average about \$10 a ton. J. H. Geiger is manager.

JEFFERSON COUNTY.

A half interest in the New Stake, Columbia, Dorothy and Erma quartz claims, near Clancey, has been bonded by J. Wols to F. A. Koetitz of San Francisco, \$1000 being paid down. A. P. and F. J. Meng of Clancey will join Mr. Koetitz in the development of the group.

LEWIS AND CLARKE COUNTY.

(Special Correspondence).—The Montana Standard M. Co. has been organized by Butte people. P. T. Davis is president, M. L. Borglum treasurer, and W. H. Lindsay secretary. The company has a group of nine claims at Marysville. Six of these are on Cruse hill in the vicinity of the Drum Lummon. The other three are on Standard mountain, north of Silver creek. The first group has a ledge of ore running in a northerly and southerly direction through a lime and slate formation. The work thereon consists of two tunnels—one running 200 feet and the other 720 feet along the strike of the vein. The group on Standard hill has an east and west vein, with a lime-quartz gangue, carrying gold capable of free milling. The development here is through two shafts—85 feet and 105 feet, respectively—which go down in ore. There is other work consisting of open cuts and tunnels. The ores are generally free milling, carried in good widths of veins. The management propose to continue development and will put in a compressor for power drills.

Marysville, July 10.

Miller & Burke have struck a pocket of ten pounds of gold nuggets in a shaft on Greenhorn gulch. They bought the claim for \$500.

MADISON COUNTY.

J. P. Reins is working the Elizabeth mine, near Rochester, and the shaft is down 100 feet. The vein is 4 feet wide and the ore is said to average \$25 gold per ton. It is sorted and shipped to the smelters.

PARK COUNTY.

The sixth vein has been struck in the Revelation lode of the Bear Gulch M. Co., at Jardine. The new strike is about 400 feet deep and 800 feet in the tunnel. The vein is 30 feet thick and the ore, rich in gold, also carries copper and iron. A 100-stamp mill and cyanide plant are projected. The present mill consists of twenty 1000-pound stamps, two Hunting-

ton mills and twelve concentrators. A 60 H. P. engine furnishes steam power when the water power is short; M. Quinn is mill Supt.

C. R. Murdoch of the Standard M. Co., at Contact, reports the mill of the Milwaukee Co. to be in operation and that ground is being broken for the erection of the 5-stamp Standard mill. The Standard has completed its road to the mine.

SILVER BOW COUNTY.

The Minnie Healey mine at Meaderville, now under control of F. A. Heinze, has been started up with a crew of sixty men. J. MacGinnis, of the Montana Ore Purchasing Co., says the number will be increased to a total of 200 or 300 men.

The Speculator mine, at Butte, is becoming involved in litigation. A suit for \$2,000,000 damages has been brought against the owners of the mine by J. A. Murray, who alleges that the rich ore mined through the Speculator has come from a vein that apexes in the Ticon and Adirondack lode claims, owned by him.

TETON COUNTY.

(Special Correspondence).—The Swift Current mining district is on a river of that name. It is 100 miles northeast of Kalispell, but is nearer to Browning station, on the Great Northern. Prospecting and a little development there has uncovered ledges of borite copper ore. One group of claims here is being developed by the Michigan-Montana C. M. Co., organized by Kalispell people. They report having done 1000 feet of work and have built a concentrator. They claim the ore mines 8% copper. A. Moore is Supt. Choteau, July 6.

NEVADA.

LANDER COUNTY.

The New Pass gold mines, at New Pass, have been bonded by W. F. Snyder at \$250,000 from P. T. Farnsworth and F. C. Mitchell until Jan. 1, 1902. He paid \$30,000 on account and is operating the property with F. Mitchell as Supt. Several thousand feet of openings have been made underground. A mill of large capacity will ultimately be required.

LINCOLN COUNTY.

The Bristol C. M. Co. are reported to have secured all claims lying and adjoining their copper property, at Bristol. W. Gelder of Denver, Colo., is the president and manager of the company, and contemplates starting the smelter at Pioche and to run two stacks, one of which will be used for the treating of custom ore. The company have completed a 100-ton ore bin on the May Day, and the machinery for the hoisting engine is being put in place.

LYON COUNTY.

L. H. Rogers, one of the parties interested in the Cuyahoga M. Co., operating in Smith valley, near Wabuska, states that his company is about to establish a pneumatic cyanide plant at the Cuyahoga mill to work the tailings.

WASHOE COUNTY.

The Cabin No. 2 mine, at Olinghouse, owned by S. Francovich, L. D. Piazzi and A. Donduro, is being operated. A shaft has been sunk 300 feet and levels run, from which rich ore is being taken out. They have a mill on the ground working on ore which will go from \$75 to \$80 per ton.

WHITE PINE COUNTY.

An accidental discovery of a possible mine has been made by A. Topiani, who had secured a contract from the Glasgow mine at Cherry Creek to supply it with wood. To cut it he had to locate a claim and sink to a depth of 10 feet. He had scarcely broken ground when a ledge of quartz showing gold was struck. An assay showed several hundred dollars a ton value, and the lucky woodchopper has sunk on the vein to a depth of 65 feet in the same class of ore.

NEW MEXICO.

GRANT COUNTY.

A rich copper strike is reported from the Burro mountain mining district upon a mine owned by Jones & Downes of Silver City. They have taken out some ore that assayed 75% copper.

SOCORRO COUNTY.

R. A. Mulvihill, M. L. Thorsell and L. M. Lasley have incorporated the Golden Bell M. Co.; capital, \$100,000; office at San Marcial.

OREGON.

BAKER COUNTY.

The Gem G. M. Co. has been incorporated by W. L. Patterson, A. T. Hendryx and A. Geiser of Baker city; capital, \$300,000.

J. C. Armstrong of Ogden, Utah, has made the final payment of \$14,000 for the King B. placer mine, near Sumpter. The ground bought is said to average 60 cents

to the cubic yard, but will require considerable outlay before it can be worked to advantage. D. Ensign of Ogden will be associated with Armstrong in the operation of the mine.

President A. J. Willet of the Cornucopia Copper Co. states that the company will soon begin larger operations on the mine at Quartzburg; also that he will soon make a visit East for a matte smelter and other machinery.

GRANT COUNTY.

(Special Correspondence).—Six miles from Sumpter, toward Granite, is the Red Rock group, which is under development by Dan Jaeger and others of Montana. Present development consists of sinking a 250-foot shaft on a lead of ore that runs nearly east and west in a slate formation, between belts of granite and porphyry. The ore encountered is a sulphide of iron, carrying \$3 to \$4 gold.

The Oregon Placer & Power Co. have about 200 acres of placer ground on Grey's creek, a branch of Granite creek. The source of water supply is Boundary creek, at the foot of Bald mountain. They have 7 miles of ditch, 1340 feet of wood flume, 2000 feet of pole race and 1150 feet of pipe line. Their claims extend along Grey's creek to a bench, where there appears to be an ancient river channel 500 feet wide, the wash said to be about 40 feet deep. In general, the placers here are said to contain little clay, not many boulders and no cement. Their water system gives 218 feet pressure. A portion of the ground worked last year is stated to have run 28 cents per cubic yard. At present two giants are at work. As the water supply is short in midsummer, the intention is to construct a storage reservoir at the upper end of the property. Work began for the season on April 10, and it is expected they can work up to October 30.

The village of Granite is 14 miles west from Sumpter, on Granite creek. Two miles below Granite Clear creek joins it, flowing from the western slopes of the main mountain range that trends in a northerly and southerly direction. Going up Clear creek and its various affluents leads you through the Red Boy and Alamo districts, and to the Red Boy, Concord, Alamo, Quebec, Scandia, St. Anthony, Belcher, Strasburg, Oro Fino and other mines. These are all on the western slope, which drains into the John Day. On the opposite or eastern slope is the Bonanza, where the ravines and canyons drain into the Powder and Burnt rivers and those into the Snake.

The Alamo, which is being developed by a Spokane company, is in charge of J. P. McGuigan. Its location is on Quebec mountain, which is the center of considerable activity. The veins here run north and south in slate. They carry a gold-bearing quartz, banded with streaks of crushed slate and talc, with streaks of iron sulphurets, which probably increase with depth. Much of this ore horns free gold readily. Ores sampled are said to average \$8 to \$17 per ton. Development comprises two tunnels, one 90 and the other 600 feet long, with a shaft and some upraises. The lower tunnel is 200 feet below the upper and the two are being connected by an upraise in ore.

The Oro Grande, also on Quebec mountain, was recently bonded to Fred Kelly of Sandon, B. C., the amount named in the bond being \$20,000. This group comprises four claims.

On the western side of this mountain is the Quebec group, belonging to the Oregon-Colorado G. M. Co., composed of Oregon and Colorado stockholders, the work being in charge of Ferris & Carr, formerly of Victor, Colo. The development thus far is through a series of tunnels, one above another, which are driven on the strike of the vein. The lower or No. 1 tunnel is now in 300 feet and it will be driven 500 feet farther, where it will give a vertical depth of 700 feet under the crest of the mountain. No. 2 tunnel, 188 feet above No. 1, has been driven 650 feet. No. 3 tunnel is being driven on the ledge, but not in pay ore. Nos. 1 and 2 are connected by an upraise in ore, and a second upraise is being made from near the breast of No. 2. It is the intention to drive all these tunnels to a point under the crest of the hill. The vein walls are slate, the ledge matter being porphyritic in some places, carrying free gold-bearing quartz and iron sulphides. The quartz horns free gold freely and specimens are numerous in which the gold is visible. A 20-stamp mill is being erected 1500 feet from the lower tunnel. The mine and mill are to be connected by a wire rope tramway line.

The Scandia M. & T. Co. of Spokane has taken up the proposition of the Aldrin tunnel, to drive into Quebec mountain from the north side. The work has progressed 825 feet at present and it is destined to go in 3000 feet and cut the crest of the mountain at 1200 feet depth. This company has some surface holdings along the tunnel's course. W. Wade of Granite

is manager and Charles Johnson of Spokane secretary.

The St. Anthony group, of which L. G. Wheeler is manager, comprises seven claims, located on the east side of Clear creek. A crosscut tunnel has been driven northeastward about 300 feet, cutting several ledges. On the latter there are some 325 feet of drifting, showing a good width of vein, carrying gold quartz and sulphurets. The vein walls appear to be slate and porphyry. The volume of the creek here is sufficient to make it available for water power, and Mr. Wheeler states that he will utilize it as such. Sumpter, July 10.

J. F. Hardee, managing owner of the Climax, situated 3 miles north of Granite, says his property is making a splendid showing. The property consists of five claims, upon which much development work has been done. From the surface down, in all the showings the ore averages \$11 to the ton, with 4 feet which goes \$28. Mr. Hardee and associates have bonded the property to Spokane people, represented by C. R. Aldrum.

Groesbeck Bros. of Salt Lake City, Utah, who were grubstaked by M. I. Clausey and Christofferson Bros., have struck a blind ledge near the Ibox group. The ledge was found by trenching the surface.

Superintendent Thatcher of the Bonanza, Sumpter, states the June cleanup as being about \$70,000.—The Red Boy mine June cleanup amounted to about \$30,000.

JOSEPHINE COUNTY.

C. R. Ray of Gold Hill has temporarily shut down all work on the Braden mine and several other prospecting enterprises in and about Gold Hill.

H. W. Kirchoff has bought the Arnett placer on Biggs creek and will put on a hydraulic plant. The claims have been worked by ground sluicing.

MALHEUR COUNTY.

Development work to test the permanency and richness of the placer mines in the big bend of Snake river is to be begun at once on an extensive scale, using a diamond drill.

UTAH.

BEAVER COUNTY.

At the Copper King mines, at Milford, bought by the Franklin Syndicate of Salt Lake City, developments are reported at a depth of 110 feet, in a crosscut through 74 feet of copper-bearing ore. In this zone there are streaks of high-grade ore. The ores occur in the form of a carbonate at present, but with depth replacement with sulphides is anticipated, and will be followed, it is stated, by the construction of a smelter.

CACHE COUNTY.

The Lucky Star M. Co. has incorporated; capital, \$50,000; J. H. Anderson is president and L. P. A. Nielsen secretary of the company at Salt Lake City. The company owns the Sunshine and four other mining claims in Blacksmith Fork canyon.

JUAB COUNTY.

The directors of the Old Colony M. Co., at Tintic, have made arrangements for the immediate sinking of a shaft. C. Brown is manager.

PARK COUNTY.

The Crescent Hill Co. are reported to intend resuming active work at the mine at Park City. Some prospecting will be undertaken before the main work is begun and the pumps started up. H. G. McMillan is manager.

SALT LAKE COUNTY.

The Phoenix of Big Cottonwood, shut down for three years, is to be reopened, so F. H. Rehman, secretary of the company at Salt Lake City, says. Arrangements will be made with Eastern people for capital required for the work and to absorb several other properties in the locality.

SUMMIT COUNTY.

The old Hawkeye claims, on Lake Flat, are to be worked again after lying idle for nineteen years. At one time the property was equipped with a first-class plant, but it was stolen during the period the mine was shut down. J. T. Donnellan, who is starting up the property again, has ordered new machinery.

Active developments at the Silver Star M. Co., at Park City, have been under M. L. Hammer, president of the company. A shaft has been sunk 125 feet to the contact between the limestone and quartzite, which has been drifted on. It is the intention now to open up an ore streak on the contact by a winze.

UINTAH COUNTY.

W. D. Munday of Vernal has bonded four claims situated in Moseley park, to F. A. Keith of Salt Lake City, for \$2000. Work will commence August 2nd, and a 300-foot tunnel is to be run to reach the ore.

WASHINGTON.

FERRY COUNTY.

W. M. Ridpath of Spokane, who is interested in the Republic mine, does not expect the mine to reopen until a railway is built into Republic. The Republic ore has steadily shown more silver with depth, he is reported as stating. The change has destroyed the usefulness of the mill. It is an excellent gold mill, but he is informed that it only recovers about 35% of the silver values. Some of the Republic ore went as high as twenty-eight ounces in silver. Of course, no medium-grade ore could stand a loss in silver equal to \$11 a ton. Therefore the mine is closed. There have been four mills in Republic, costing nearly half a million dollars. All of them have proven unsuited to their work.

The Bodie mine, at Bodie, on Toroda creek, shut down for several months past, has resumed operations. W. G. Madison, president and general manager of the Bodie G. M. Co., states that he has let a contract to sink the 30-foot shaft 50 feet deeper. He has ordered the 450-foot tunnel advanced until it intersects the Bodie ledge close to the face of the tunnel.

OKANOGAN COUNTY.

Four feet of chalcopryite ore has been struck in the Rainbow at Bolster.—The second payment on the bond on the Copper Queen and No. 9 claims has been made and two shifts are at work on the property.—M. M. Walsh, Supt. of the Monterey G. M. Co., operating the Buckhorn, says the tunnel is in 600 feet.

SPOKANE COUNTY.

The Copper Chief M. Co. has incorporated at Spokane, capital \$375,000. H. A. Fosselman, J. W. Phillips, W. D. Vincent, John Phillips, F. M. Long, John Brown and T. J. Shea are the trustees.

The Ophir G. & C. M. Co. has incorporated in Spokane, capital \$100,000. T. B. Garrison, W. Y. Clark, Thomas Hird, M. A. Mitchell and D. P. Bagnell are the trustees.

The Western Development Co. was incorporated at Spokane, capital \$2,500,000. R. W. Kennedy, Frank Walton, L. G. Hays, J. W. Hays, D. W. Henley, A. M. Premo and A. G. Kellam are the trustees.

The Daines M. & M. Co. has been incorporated; capital, \$100,000. The trustees are G. W. Daines, W. R. Eisenhour, M. A. Dehuff, W. H. Jackson and A. Stern, all of Spokane.

P. Clark's new corporation, the Spokane Development Co., has incorporated; capital, \$1,000,000. Spokane people, with H. Frank of Butte, Mont., will take practically all of the stock. "The company will operate all over the Northwest," so Mr. Clark says. "We have already secured several interests on Prince of Wales island, Alaska, and we shall do a good deal of work there. We have also taken hold of a big free-milling proposition near Cape Nome. It will be purely a development company."

STEVENS COUNTY.

(Special Correspondence).—The Great Republic mine, C. C. Knuston manager, situated 8 miles from Northport, has installed a steam hoist in its tunnel, preparatory to sinking a shaft on the first of three veins opened by the tunnel. The ore is auriferous pyrrhotite and chalcopryite in a quartz vein in diorite.

Northport, July 11. H. S. R.

Manager M. C. Cooper of the Union G. M. Co. says his company has given a bond at \$65,000 on the Montana to W. H. Brown, representing a Toronto syndicate.

FOREIGN.

BRITISH COLUMBIA.

(Special Correspondence).—The Granby Smelter, at Grand Forks, is operating two furnaces and has ordered two more, which will increase the capacity of the plant to about 1200 tons per day. It is also given out that copper converters are to be put in, to reduce the copper matte to bullion. The ores which keep the plant running come mainly from the mines of the Boundary district; they consist of a copper and iron sulphide, whose values are gold, silver and copper. It is claimed they have smelted 175,000 tons of ore within the last eighteen months. It seems probable that a branch of the Great Northern will be built from Grand Forks to Republic, Wash., to afford ore transportation from Republic to the Grand Forks Smelter. It is believed the highly siliceous ores of Republic camp may be mixed with the sulphides of the Boundary district and successfully smelted. This railroad proposition contemplates the building of a line from Marcus, on the Spokane-Rossland line, up the Kettle river via Grand Forks to Republic, thence westward to Midway, and then to a point on the Okanogan river, where connection will be made with boats to the Columbia.

The cyanide mills erected at Republic

do not appear to have operated satisfactorily thus far. The ores, in which the gold values are the more important, carry good values in silver, and the latter could not be saved to a satisfactory per cent. Then the ores carry no iron or lead base, but run about 80% silica; they are not suited to concentration, because the material is of a uniform specific gravity; hence the new railroad line that will give the Republic ores an outlet to the smelters is at present of vital interest to the district. It is claimed, optimistically, that the district mines could ship 700 to 1000 tons of ore to the smelter daily.

Grand Forks, July 13. WASCOTT.

The Eva mine on Fish river, Lardeau district, has been sold by the Imperial Development Syndicate, Ltd., A. H. Gracy manager, to the London & British Columbia Gold Fields. There are a number of free milling gold ledges on this property.

A. F. Rosenberger of Nelson has bonded the Oyster group on Lexington mountain, adjoining the Eva mine. Development work will be started at once.

At the Silver Hill mine, in Ainsworth mining district, development work is projected to start up soon. A tramway from the mine to the wagon road will be built. The last payment on the bond of the Iron Horse, Ten Mile, Slovan City mining division, has been made, completing the total of \$19,500. The property is being developed. It is said additional machinery will be installed.

Nelson, B. C., July 5.

The annual report of the Minister of Mines shows a material increase in all varieties of mining during 1900. In assembling the output of the lode mines in the tables the established custom of the department has been adhered to, viz., the output of a mine for the year is considered that amount of ore for which the smelter or mill returns have been received during the year. In the table the amount of the shipments has been obtained from the certified returns received from the various mines. In calculating the values of the products the average price for the year in the New York metal market has been used as a basis. For silver, 95% and for lead 90% of such market price has been taken. Treatment and other charges have not been deducted:

BRITISH COLUMBIA OUTPUT, 1900.

	Quantity.	Value.
Gold, placer, ozs....	63,936	\$ 1,278,724
Gold, lode, ozs.....	167,153	3,453,381
Silver, ozs.....	3,955,175	2,309,200
Copper, lbs.....	9,997,080	1,615,289
Lead, lbs.....	63,358,621	2,691,887
Coal (ton 2240 lbs.)	1,439,595	4,318,785
Coke (tons 2240 lbs.)	85,149	425,745
Other materials....	.....	251,740

Total.....	\$16,344,751
Output 1899.....	12,393,131

Increase 1900 ... \$ 3,951,620

PRODUCTION BY DIVISIONS.

	1899.	1900.
Cariboo.....	\$ 180,000	\$ 162,000
Quesnel.....	193,300	510,000
Omineca.....	8,600	12,527
Cassiar.....	819,380	467,479
East Kootenay....	523,666	2,855,851
Ainsworth.....	297,930	349,465
Nelson.....	879,185	787,082
Slocan.....	1,740,372	2,063,908
Trail Creek.....	3,229,086	2,739,300
Lillooet.....	69,558	88,493
Osoyoos.....	234,167	1,358,383
Similkameen.....	6,609	4,800
Yale.....	75,089	59,282
Coast.....	4,094,903	4,805,153
Other parts.....	41,286	81,208

Totals\$12,393,137 \$16,244,751

Improvements are being made upon the Lenora mining property at Mt. Sicker, Vancouver island. The new two-drill compressor has commenced work on No. 3 tunnel. A winze has been sunk from No. 2 tunnel, which will connect with No. 3 tunnel, and through which all the ore from both will be taken out. A three-compartment shaft is also being started. The mine is shipping sixty tons of ore daily.

The St. Eugene Co. are planning a new arrangement for handling their ore. J. Cronin, the manager, says: "We are now sending our ore to Antwerp and to Hamburg, but freight and treatment rates on it are about \$31 a ton. Shipping 100 tons daily, the monthly freight and treatment bill is \$90,000. We are negotiating with other European smelters to handle our ore, and hope to make satisfactory arrangements, otherwise the mine will stop shipments."

A Vancouver syndicate, J. F. Howe manager, is developing a gold property on the Seymour narrows, above Comox, on Vancouver island. The ledge through three claims is some 200 feet wide and carries an iron capping. Assays from the

surface of the capping gave values of \$5 in gold and copper. At a depth of 30 feet the shaft was well through the capping and the copper and gold values increased until they reached about \$13 to the ton. A crosscut on the ledge has been run in for 75 feet, and the values in the bottom of the shaft are well maintained. A dispute has arisen between the syndicate and the Esquimalt & Nanaimo Railway Co., the latter claiming the mine on the ground that it is an iron mine, and that under the terms of its grant it is entitled to all its base metals.

The preliminary surveys for the compressor plant of the Payne M. Co. have been made. Supt. Garde states that if sufficient water power can be developed on the site chosen a 12-drill compressor will be built immediately. Regarding the proposed concentrator, tests are being made of the dumps and the waste in the mine, and if these tests justify the construction of a mill it will be commenced. No extensive operations will be undertaken until the air compressor is finished, so that cheap power can be furnished.

The directors of the Ymir mines announce that the experimental cyanide plant is a success, and that a large plant will be installed immediately. It is also probable that the number of stamps will be doubled and the cyaniding plant will probably be built to treat about 400 tons daily. The saving of the cyanide plant is about \$1 per ton, equivalent to an addition of between \$5000 and \$6000 to the monthly profits with the present ore production.

The Anderson Lake M. & M. Co., near Lillooet, are reported to have cleaned up for May from a twenty days' run eighty-five ounces of gold. During the run in April ninety-eight ounces, value \$1645, was cleaned up.

KLONDIKE.

The reports from Salmon district are said to be encouraging. The district is full of prospectors who are making new and rich finds daily. Considerable development work has been done on many claims and surface indications of value are being verified. There are already hydraulic propositions on which machinery is in operation. Hootalingwa, the starting point for the new diggings, is rapidly growing into a city.

It is stated that the uncompleted stretch of telegraph line from Ashcroft, B. C., to Dawson has been finished and the gap on the Stickeen river closed.

MEXICO.

(Special Correspondence).—At the Alma mine, Carbo, Sonora, three shafts are under way and 1000 tons of ore out on the dumps already. The mine comprises thirty pertenencias (sixty-four acres) in original mine, patented, and 500 acres adjoining, denounced. Through this area runs a large copper-bearing dike, outcropping 60 feet wide for a mile in length, and showing ores carrying gold and silver additional. C. C. Taft and others in Des Moines, Iowa, are incorporating the Alma M. Co., for the purpose of working the mine and erecting smelter or other reduction works. A. Graves is general manager.

Carbo, Sonora, Mexico, July 10.

The Taxco M. & M. Co. has incorporated at Denver, Colo., to operate in the Taxco mining district in the State of Guerrero, and also in the adjoining State of Michoacan. The president of the new company is A. C. Beatty of Denver. Associated with him are W. V. Hodges of Denver and B. S. Revett.

W. B. Gester, manager of the quicksilver mines at Saucillo, Chihuahua, reports that a 12-ton furnace for the treatment of the lower grade ores, of which there is a large quantity on the dump, will be started before August. Two retorts are in operation for the treatment of high-grade ores. Four shafts are now being sunk and the two tunnels have been connected.

The Verde Grande C. Co. has been incorporated at St. Louis, Mo., to work a group of copper, silver and gold properties about 25 miles from Hermosillo. R. P. Serrano, Mexican consul at St. Louis, is president. G. H. Martin of St. Louis secretary. A contract for a smelter has already been let and work will begin on it shortly.

PERU.

A copper and silver mining enterprise is being organized by A. W. McCune and other Salt Lake, Utah, people, associated with Butte and New York financiers, including the Hearst and Tevis estates. A company is said to be organized with \$10,000,000 capital, to buy Peruvian mines that have been producing silver and copper for nearly 300 years. J. MacFarlane, formerly of the Anaconda, and later of the Montana Ore Purchasing Co., who has examined the mines, says there is ore in sight valued in the millions.

Personal.

F. B. TURNER of Butte, Mont., is in Los Angeles, Cal.

E. B. RODGERS of San Francisco, Cal., is in Salt Lake City, Utah.

C. T. LINDER of Columbia, Cal., has returned there from New York.

FRANK MILLER of Pitkin, Colo., is visiting Dawson, Yukon Territory.

F. M. BISHOP of Salt Lake City, Utah, has returned there from Mexico.

FORBES RICKARD of Colorado is in California examining mother lode properties.

J. H. KETLEY has resigned as outside foreman of the Ontario mine, Park City, Utah.

E. P. JENNINGS of Salt Lake City, Utah, is in Michigan examining a copper property.

J. P. HANNA of Cincinnati, O., has recently visited the Gold Hill mine, at Express, Or.

VICTOR M. CLEMENT of Salt Lake City, Utah, is in Parral district, Chihuahua, Mexico.

L. CHAPPELLE, lately of Mexico, is now Supt. of the Mohican M. Co. at Carters, Tuolumne county, Cal.

R. S. ROSE of Marquette, Mich., is examining mining property near Nelson, B. C., for Montreal parties.

P. J. DONOHUE of Salt Lake City, Utah, has returned there from a visit to the Sivirioja mines in Mexico.

F. M. SMITH of Montana is in Salt Lake City, Utah, as assistant manager American S. & R. Co. plants in Utah.

E. H. BARTON, C. E., of Sonora, Cal., is in Randsburg, engaged in engineering works for the Yellow Aster M. Co.

J. E. BEVERIDGE of Salt Lake City, Utah, is in charge of operations on the Snyder property at New Pass, Nev.

MAJ. B. C. KINGSBURY of Spokane, Wash., has returned to that place from a visit to Prince of Wales Island, Alaska.

H. S. TURNER of San Francisco, formerly with the U. S. Geological Survey, is in New Mexico examining copper properties.

WALDEMAR LINDGREN of the U. S. Geological Survey is in Placer county, and later will be in Sierra and Plumas counties, Cal., making further detailed investigations of the Neocene river system of the Sierra Nevada mountains.

Recently Declared Mining Dividends.

Gold King M. Co., Colo., quarterly, 3 cents per share, \$23-108.50.....	July 20
Vindicator G. M. Co., Colo., quarterly, 3 cents per share, extra 2 cents, \$55,000.....	July 25
Portland G. M. Co., Colo., quarterly, 6 cents per share, \$180,000.....	July 15
Butterfly-Terrill M. Co., Colo., quarterly, 1 cent per share.....	July 15
New Home M. Co., Colo., monthly, \$12,500.....	July 20
Town Topics G. M. Co., Colo., No. 2, 1 cent per share.....	Aug. 1
Gwin Mine Dev. Co., California, No. 23, 10 cents per share, \$10-000.....	July 16
Con. Mercur M. Co., Utah, quarterly 12 cents per share, \$125-000.....	Aug. 1
Ontario M. Co., Utah, \$15,000....	July 15

Commercial Paragraphs.

THE offices and salesroom of the California Wire Works of San Francisco have been moved to 17 and 19 Fremont street, San Francisco, Cal.

New Patents.

DEWEY, STRONG & CO.'S SCIENTIFIC PRESS PATENT AGENCY, 330 Market St., S. F., has official reports of the following U. S. patents issued to Pacific coast inventors:

FOR THE WEEK ENDING JULY 9, 1901.

677,925.—BARBED FENCE—C. C. Benson, San Diego, Cal.	
678,157.—DYNAMO—B. Bjarnason, Seattle, Wash.	
677,951.—NECKTIE HOLDER—P. M. Gady, S. F.	
677,961.—RAILWAY CAR—G. W. Douglas, S. F.	
677,962.—TRACK BRAKE—G. W. Douglas, S. F.	
677,961.—TERRA-COTTA WARE—E. G. Durant, Pasadena, Cal.	
678,239.—TRUSS BRIDGE—T. G. Gilliland, Union, Or.	
677,982.—PISTON VALVE—J. T. Heffernan, Seattle, Wash.	
678,297.—LIFE RAFT—J. V. Janin, Seattle, Wash.	
677,992.—BLUESTONING SEED—A. J. Johnson, Arbuckle, Cal.	
678,018.—PROTRACTOR PATTERN—J. M. McFarland, Los Angeles, Cal.	
678,014.—VALVE SEAT—E. H. Merrill, S. E.	
678,025.—VEHICLE WHEEL—G. V. Orton, Monterey, Cal.	
678,197.—BED AWNING—L. Price, Los Angeles, Cal.	
678,198.—CENTRIFUGAL PUMP—J. Richards, S. F.	
678,199.—CENTRIFUGAL PUMP—J. Richards, S. F.	
678,201.—PROTECTING TIMBER—C. Schallberger, Seattle, Wash.	
677,910.—PRINTING PRESS—L. B. Woodruff, San Miguel, Cal.	
678,090.—LOGGING RAILWAYS—N. Young, Eureka, Cal.	

Latest Market Reports.

SAN FRANCISCO, July 18, 1901.

SILVER.—Per oz., Troy: London, 26½d (standard ounce, 925 fine); New York, bar silver, 58½c (1000 fine); San Francisco, 58½c; Mexican dollars, 47½c San Francisco, 46½c New York.

COPPER.—New York: Lake, 1 to 3 casks, \$17.25; carload lots, \$17.00; Electrolytic, 1 to 3 casks, \$16.75; carload lots, \$16.62½; Casting, 1 to 3 casks, \$16.60; carload lots, 16.50. San Francisco: 18. Mill copper plates, 20c; bars, 22½c. London: £68 per ton.

LEAD.—New York, \$4.37½; Salt Lake City, \$4.00; St. Louis, \$4.40; San Francisco \$4.90, carload lots; 5½c 1000 to 4000 lbs.; pipe 6, sheet 6½, bar 5½c; pig, \$5.25. London, £12 2s 6d per ton=2.62 cents per lb.

SPELTER.—New York, \$4.20; St. Louis, \$3.75; London, £16 2s 6d per ton =3.58½ cts. per lb.; San Francisco, ton lots, 5½c; 100-lb lots, 6c.

ANTIMONY.—New York, Cookson's, 10c; Hallett's, 9c; San Francisco, 1000-lb. lots, 10c; 300 to 500 lbs., 11c; 100-lb. lots, 13½c.

IRON.—Pittsburg, Bessemer pig, \$16.00; gray forge, \$14.00; San Francisco, bar, per lb., 2.65c in small quantities.

STEEL.—Bessemer billets, Pittsburg, \$25; open hearth billets, \$27.00; San Francisco, bar, 7c to 12c per lb.

TIN.—New York, pig, \$26.00; San Francisco, ton lots, 30c; 1000 lbs., 30½c; 500 lbs., 30½c; less, 31c; bar tin, \$3.35c.

QUICKSILVER.—New York, \$51.00 large lots; London, £9 2s 6d; San Francisco, local, \$48.00 per flask of 7½ lbs.; Export, \$45.00.

MAGNESIUM.—New York, \$2.90 per lb.; San Francisco, \$3.75.

ZINC.—San Francisco, 5½c; slab, 5½c; bar, 7c; zinc dust, N. Y., 8c.

BABBITT METAL.—San Francisco, No. 1, 10c.

SOLDER.—Half-and-half, 100-lb. lots, 19c; San Francisco, Plumbers', 100-lb. lots, 15½c.

PHOSPHORUS.—F. o. b. New York 50¢60c per lb.

ASSAY LITHARGE.—San Francisco, 10c per lb, small lots.

BISMUTH.—New York, \$2.25 per lb.; San Francisco, \$2.50 to \$2.75 per lb.

PLATINUM.—San Francisco, crude, \$22 per oz.; New York, \$22 per Troy oz.

FERRO-MANGANESE.—Pittsburg, 80%, domestic, \$58.50, large lots.

TUNGSTEN.—New York, \$1.95c; San Francisco, \$1.15c.

FERRO-TUNGSTEN.—New York, 37%, 32c; San Francisco, 65c (60%).

NICKEL.—New York, 50¢60c per lb.

ALUMINUM.—New York, No. 1, 99% pure ingots, 35c; No. 2, 90%, 30c to 35c.

POWDER.—F. o. b. San Francisco: No. 1, 70% nitro-glycerine, per lb., in carload lots, 15½c; less than one ton, 17½c. No. 1*, 60%, carload lots, 13½c; less than one ton, 15½c. No. 1** 50%, carload lots, 11½c; less than one ton, 13½c. No. 2, 40%, carload lots, 10c; less than one ton, 12c. No. 2* 35%, carload lots, 9½c; less than one ton, 11½c. No. 2** 30% carload lots, 9c; less than one ton, 11c. Black blasting powder in carload lots, minimum car 728 kegs, \$1.50 per keg; less car lots, \$2 per keg.

CAPS.—3x, \$5.50 per 1000; 4x, \$6.50; 5x, \$8; Lion, \$9, in lots not less than 1000.

FUSE.—Triple tape, \$3.60 per 1000 feet; double tape, \$3.00; single tape, \$2.65; Hemp, \$2.10; Cement No. 2, \$3.00; Cement No. 1, \$2.65, in lots of 3000 feet and up.

CANDLES.—Granite 6s, 16 oz., 40s., 9½c per 40s.; 14 oz., 40s., 8½c.

OILS.—Linseed, pure, boiled, bbl., 75c; cs., 80c; raw, bbl., 75c; cs., 78c. Deodorized Stove Gasoline, bulk, 14½c; do., cs., 20½c; 86° Gasoline, bulk, 20c; do., cs., 26c; 63° Naphtha or Benzine, deodorized, in bulk, per gal., 13½c; do., in cs., 19½c; Lard Oil, Extra Winter Strained, bbl., 75c; cs., 80c; No. 1 bbl., 50c; cs., 55c. Neatsfoot Oil, cooper's bbls., 60c; cs., 65c; No. 1 bbl., 50¢52½c; cs., 55¢57½c.

CHEMICALS.—Cyanide of potassium, 98%-99%, jobbing, 32½¢33½c per lb.; carloads, 30¢31c; in 10-lb. tins, 40c; sulphuric acid, in carboys, 66½¢ B, 2c per lb.; soda ash, \$1.90 per 100 lbs.; hyposulphite of soda, 2½¢3c per lb.; blue vitriol, 5½¢6½c per lb.; borax, concentrated, 7½c per lb.; chlorate of potash, 12¢13c; roll sulphur, 6c; alum, \$1.90 to \$2.00; flour sulphur, French, 2½¢24c; California refined, 1½¢2c; nitric acid, in carboys, 8c per lb.; caustic soda, in drums, 3¢4c per lb.; Cal. s. soda, bbls., \$1.00, sks., 95c per 100 lbs.; chloride of lime, spot, \$2.50 to \$2.60; nitrate of potash, in kegs, 8c; caustic potash, 10c in 40-lb. tins.

COAL.—San Francisco, coast, yard prices: Wellington, \$9; Seattle, \$7.00; Coos Bay, \$5.50; Southfield, \$9.00. Cargo lots, Eastern and foreign: Wallend, \$8.00; Brymbo, \$7.50; Pennsylvania, hd., \$14.00; Scotch, \$8; Cumberland, \$12; Cannel, \$9.50; Welsh Anthracite, \$12.00; Rock Springs, \$8.50; Colorado Anthracite, \$14.50. Coke, \$16 per ton in bulk; \$18 in sacks.

Notices of Recent Patents.

Among the patents recently obtained through Dewey, Strong & Co.'s SCIENTIFIC PRESS U. S. and Foreign Patent Agency, the following are worthy of special mention:

BOILER-LEVELING DEVICE.—No. 677,508. July 2, 1901. P. R. Grisez and J. S. Walsh, Montague, Siskiyou county, Cal. This invention is directed to the leveling of portable boilers and thrashing machines or separators when they stand upon uneven ground. It consists of a screw and connections by which it is adjustably supported from the axle or bolster of the machine; a nut and a saddle within which the nut is turnably supported, the saddles serving to support the boiler or other part to be leveled.

WEIGHING MACHINES.—No. 677,636. July 2, 1901. J. Manes, San Francisco, Cal., assignor to Suspension Beam Scale Co. This invention relates to improvements in balances for weighing liquids, solids, and other bodies. It consists of stirrups upon each side of the balance-beam, by which the device is suspended, weighing or platform stirrups similarly attached, a weighing platform provided with trucks upon which trucks and the like may be rolled and weighed, a liquid measuring tank, and means by which the platform may be raised from its bed, and cleared from the ground.

BICYCLE BRAKE AND SUPPORT.—No. 677,804. July 2, 1901. J. Schulte, Jr., Monterey, Cal., assignor of one-half to H. J. Henneker. This invention relates to an adjustment for bicycles, which serves the double purpose of a brake and as a support to retain the bicycle in an upright position when not in use. It consists of a pivoted turnable structure, having a shoe adapted to contact with the ground; a foot piece turnable about the pivot point to depress the shoe; a catch or latch mechanism to hold it after the shoe has been brought into contact with the ground, and a releasing device and returning spring to throw the parts into their normal position when the brake is not in use.

APPLIANCES FOR LOGGING RAILWAYS.—No. 678,000. July 9, 1901. Nelson Young, Eureka, Cal. This invention relates to an improved device for use in logging camps, to prevent the twisting of the heavy cables by which the logs are drawn through the woods. It consists in combination with a road bed and a surface-traveling traction cable, of a triangular plate secured at one apex to the cable, the base of said plate being adapted to rest upon the ground at right angles to the line of travel. There are means central of this base whereby a sled may be attached, and guides disposed at the inner sides of the curves in the road-bed whereby the center of the base of the plate is made always to travel central of the road-bed.

VEHICLE WHEELS.—No. 678,025. July 9, 1901. G. V. Orton, Monterey, Cal., one-twentieth assigned to David Jacks, same place. This invention relates to improvements in wheel attachments whereby the tire and rim are held together without the use of bolts or similar binding devices, and whereby the spokes may be tightened and the felloes expanded whenever necessary. It

consists essentially of a peripheral channel formed on the inner side of the tire, a peripheral projection upon the rim fitting said channel, a cover key whereby the alignment of the felloes is maintained and by which they are expanded, a seat for the spoke tenons, a jam-nut by means of which the spokes may be tightened, and of other details.

REMOVABLE VALVE SEAT.—No. 678,014. July 9, 1901. E. H. Merrill, San Francisco, Cal. This invention relates to improvements in gates or similar devices for the control of the flow of liquids. It consists in combination with a casting, of a pipe section entering the same and means whereby the pipe section is detachably secured to the casting, a valve, a ring detachably fitted to the end of the pipe section and having a flanged face portion of great diameter than the pipe section, adapted to extend over the edge of the pipe section and form a valve seat and extended bearing, said ring having interior grooves which may be engaged by a tool to detach the ring, and said casting having an opening of sufficient size to admit the pipe section and its ring.

NOTICE.

THE JAMESTOWN MINING AND MILLING COMPANY beg to announce to the public that they are now open for its inspection. Their property consists of three full mining claims in the very heart of the great gold district of Tuolumne County. Among their property is the well known "BADGER" mine, which is adjacent to the famous "ROYAL," for which an offer of \$1,500,000 was recently refused. The ore of the Badger mine is ribbon quartz, having an average of 815 in free gold and carrying about one and one-half per cent of sulphuric acid, assaying from \$250 to \$300 per ton. With improved machinery, the cost of mining and milling will not exceed \$3.25 per ton. Now, in view of the fact that the JAMESTOWN M. & M. CO. realize that, in order to make their mines productive and paying properties, they must equip and prepare the mines for the extraction of ore, they will place 25,000 shares of their treasury stock, which is 100,000 shares, on the market at the very low price of 50 cents per share, which will place the mine on a first-class paying basis, in view of the developments already done on the mine. And they are confident that the last 50,000 shares will have a value of \$2.50 per share. To those contemplating an investment, this is a first-class proposition and one that cannot afford to be overlooked. It will bear the closest investigation. PROSPECTUS and the fullest information can be had at the Company's office, Room 21, No. 40 Montgomery St., San Francisco.

J. W. BYRD, Secretary.

MINERS' AND PROSPECTORS' GUIDE.

REVISED THIRD EDITION.

Published by JAMES IRVING & CO.,
128 N. Main St., Los Angeles, Cal.
Contains U. S. State and Territorial Mining Laws, as well as much useful information for miners and millmen.

Price 25 Cents.

SITUATIONS WANTED.

YOUNG MAN would like position as ASSAYER Recent technical graduate. Good references. Address F. L., care of Mining and Scientific Press.

A first-class machinist, engineer and cyanide man wants situation. Ten years' experience in cyanide plants; three years foreman; three years superintendent. All references. Box 31, this office.

WANTED.—POSITION BY PARTY, 35, WHO desires practical experience as assistant to surveyor or superintendent. Has had experience for mining company as all round office man. Has taken surveying and assaying course. Address C. M., care this office.

WANTED.—Position as Superintendent of mine or mill by a technical graduate. Has had experience for a 20-stamp mill and cyanide plant. Am a good assayer and mine surveyor, also a U. S. Deputy Mineral Surveyor. Address B. M., care Mining and Scientific Press.

WANTED, a position as superintendent of quartz mine. Have had years of experience. Can do any thing about a mine or mill. Know the value of a dollar in labor or material, with common sense to back me. No objections to go to South Africa, Corea or Mexico. Can give references. Address B. M., care this office.

Superintendent of a large silver-lead mine for the last five years wishes to change position. Has worked in Montana, Idaho and Canada for 22 years as a miner, foreman, superintendent and manager. Thoroughly competent assayer and surveyor, competent to handle men. Care B. C. A., Mining and Scientific Press.

Position as Superintendent or Millman

by one experienced in wet and dry crushing, cyaniding, pie amalgamation assaying, and melting of bullion. References furnished. Address H., care Mining and Scientific Press.

PRACTICAL COPPER SMELTERMAN,

experienced with large plants and with all references, and change from present position. Knows the business thoroughly. Will act as Supt. or foreman. Address "Ajax," Mining and Scientific Press.

PRACTICAL SMELTERMAN,

who had experience with sulphide and carbonate copper and lead ore in California and Mexico, competent to design or take charge of smelter, wants responsible position as chemist, furnace boss or superintendent. Address "Metallurgist," care Mining and Scientific Press.

WE BUY very rich Ores, Dental Scraps, Tellurium Ores, Mill Wastes, Jewelers' Sweeps, Gold Retorts, Old Iron Retorts, Base Amalgam, Quicksilver, Amalgamated Plates, Gold and Silver, Old Slags.

A. M. DONALDSON & CO.,

ASSAYERS AND WASTE PRODUCT SMELTERS,
1661 Larimer St., Denver, Colo.
Donaldson's Assayers' Slag Hammer {1lb. \$1.10
1lb. 8oz. \$1.25

THE UNDERSIGNED, TRUSTEE IN BANKRUPTCY of Wolff & Zwicker Iron Works, bankrupt, is about to offer for sale the entire plant of that company, consisting of foundry, machine shop, pipe shop, boiler shop, blacksmith shop, and ship tools.

The plant comprises about three acres of land and the buildings thereon, situated in the city of Portland, Oregon, at the east end of the Madison Street bridge on Hawthorne avenue, East Water street, and having a frontage on the Willamette river.

Parties interested are invited to correspond with the trustee; will furnish full particulars, and inspection is invited.

H. G. PLATT,

Trustee in Bankruptcy, Wolff & Zwicker Iron Works, Bankrupt.

BRITISH COLUMBIA MINES.

Mines and prospects in British Columbia and the Northwestern States.

Free-milling Gold properties on very reasonable terms.

Excellent chance for profitable investment in legitimate mining.

Correspondence solicited.
Address **ANDREW F. ROSENBERGER,**
P. O. Box 700, Nelson, British Columbia.

Attention of Mining Men

and others is invited to the
**DEAN-OVIATT ORE ROASTER AND
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WELL WORTH YOUR INVESTIGATION!

Interest For Sale.

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(—) Indicates every other week or monthly advertisements.

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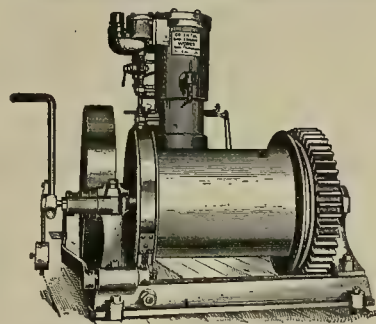


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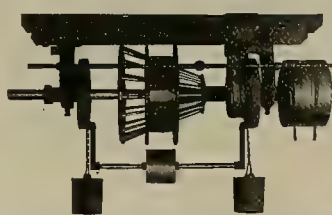
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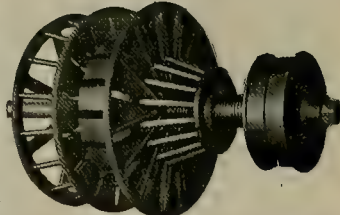
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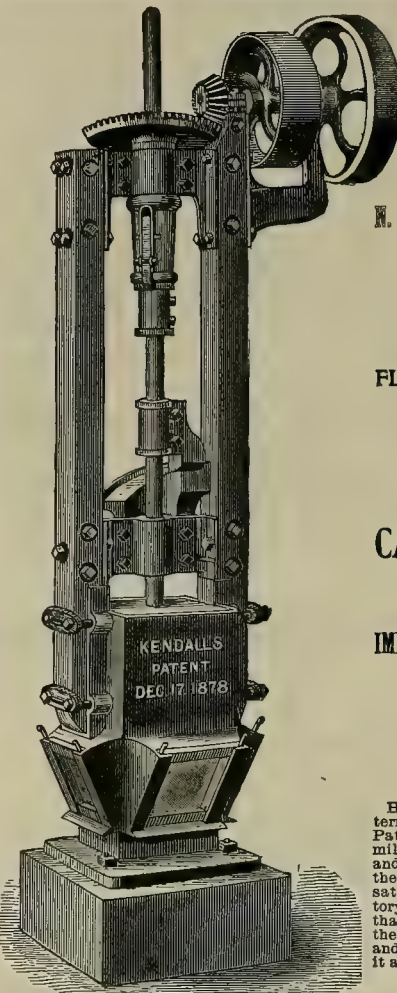
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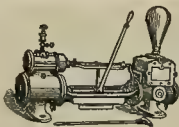
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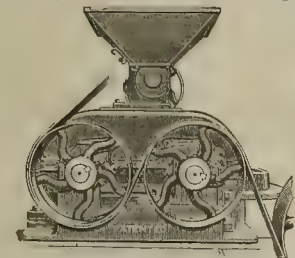
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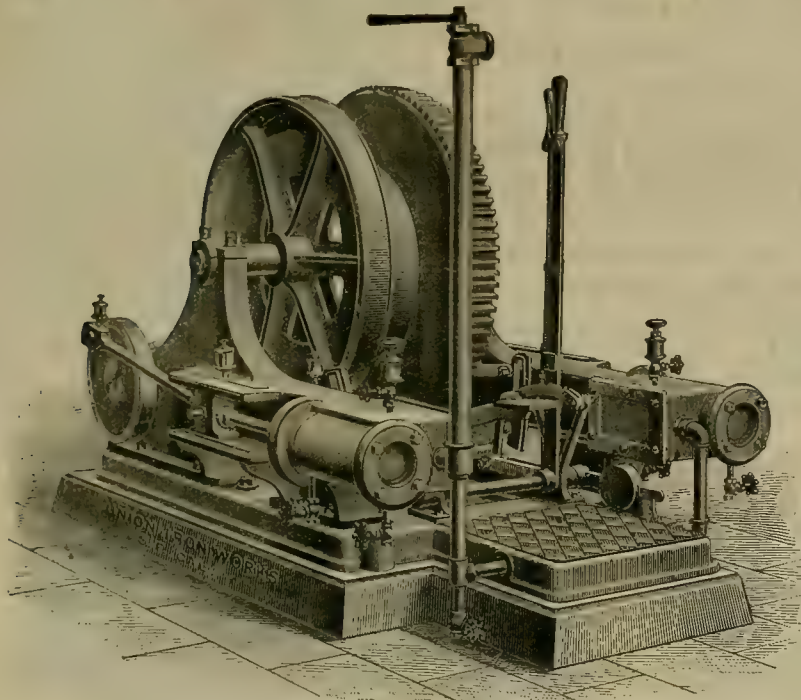


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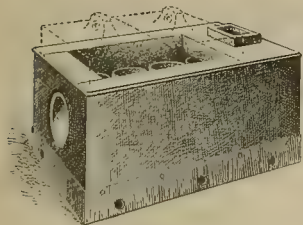
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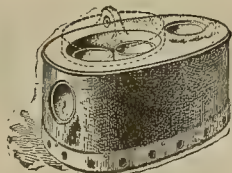
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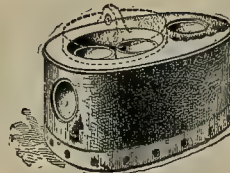
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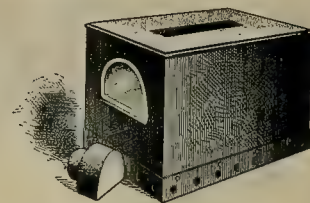
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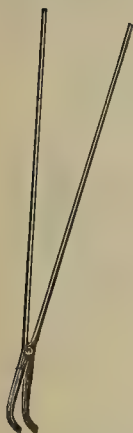
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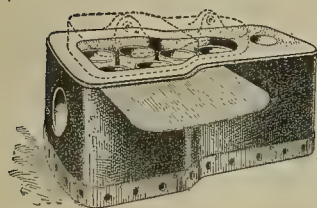
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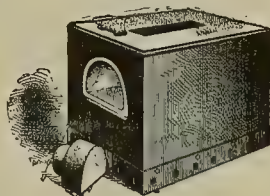
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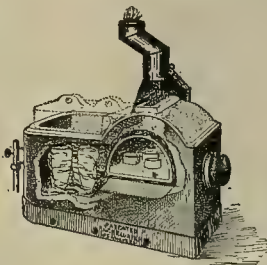
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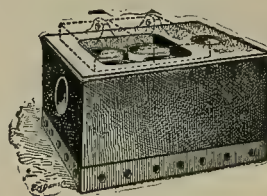
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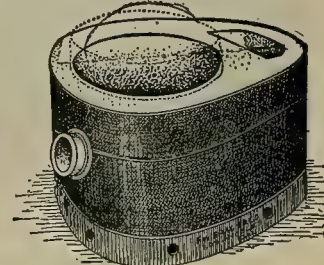
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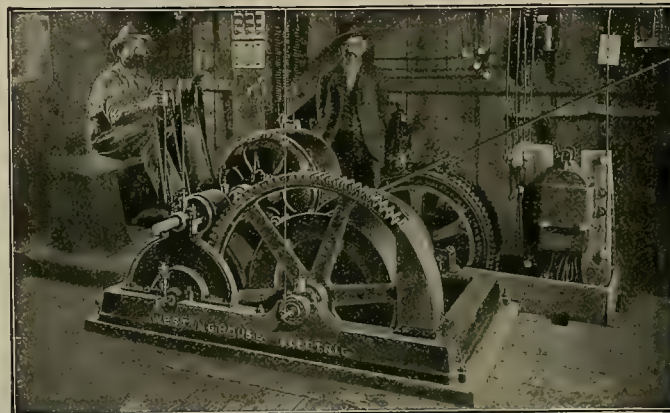
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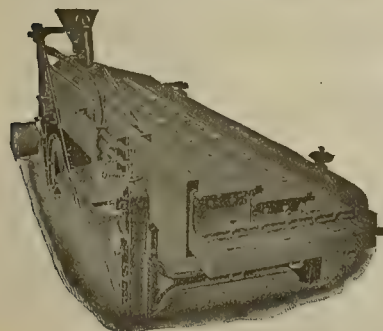
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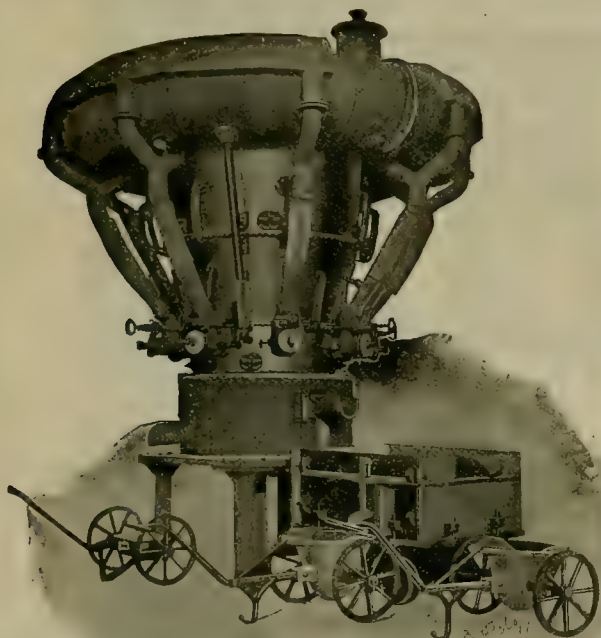
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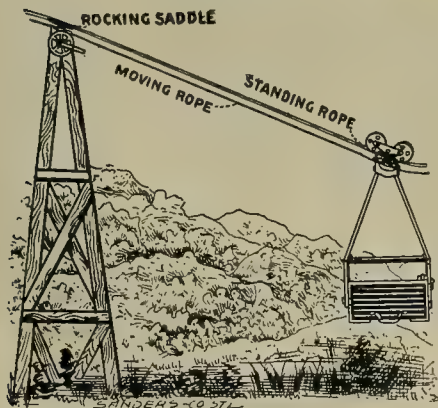
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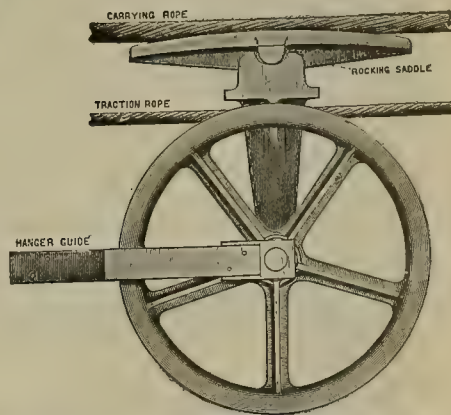
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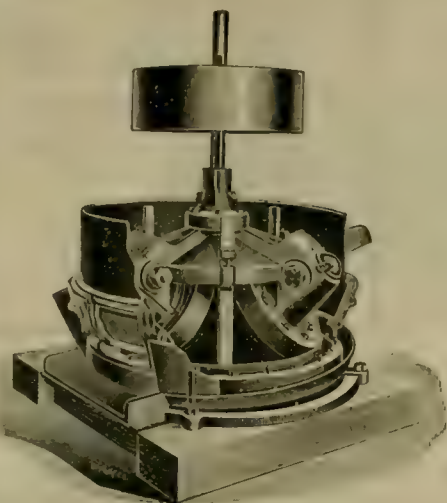
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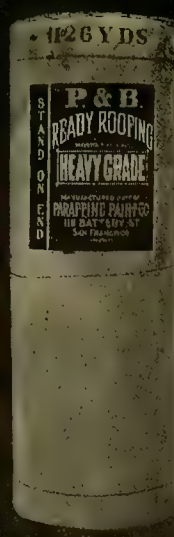
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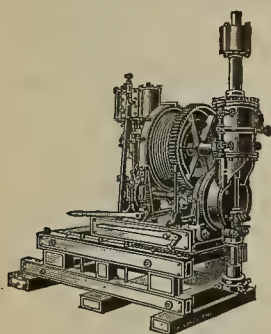
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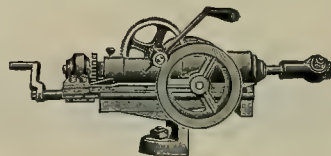
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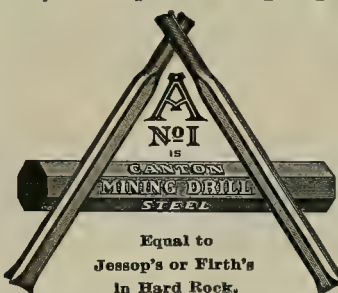
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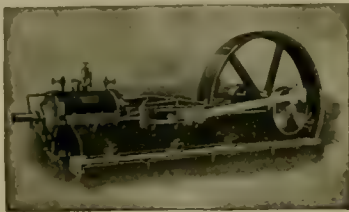
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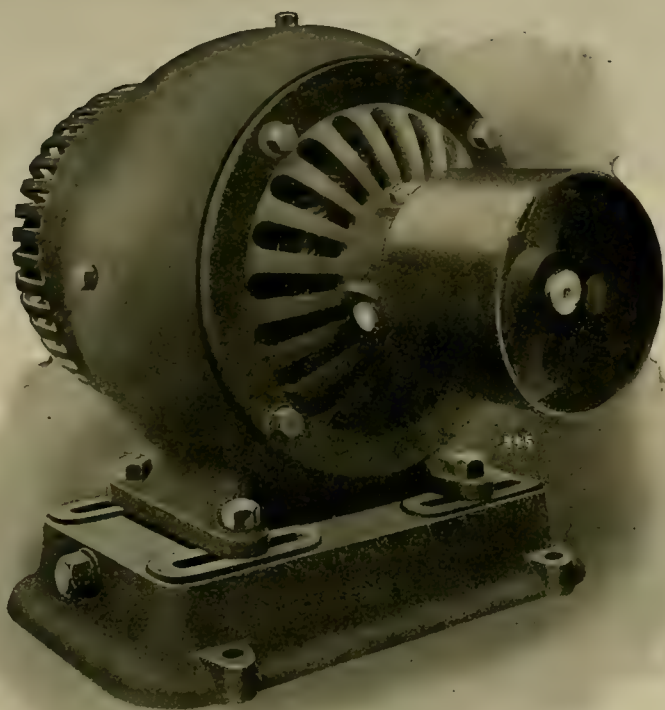
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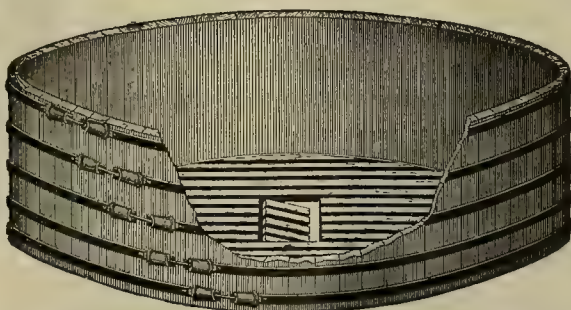
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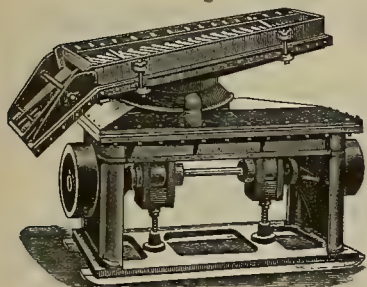
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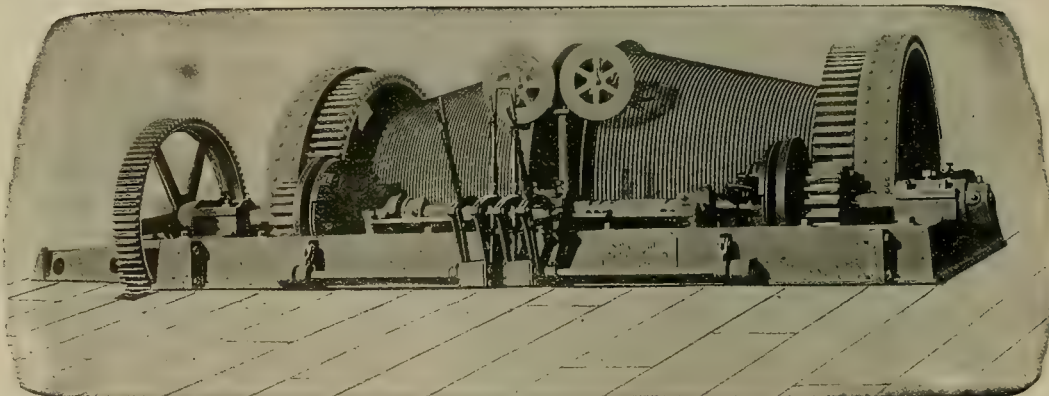
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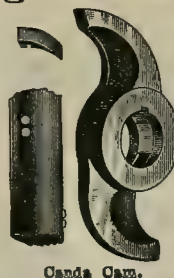
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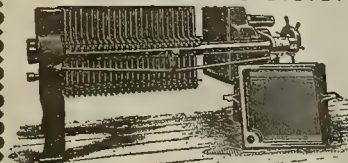
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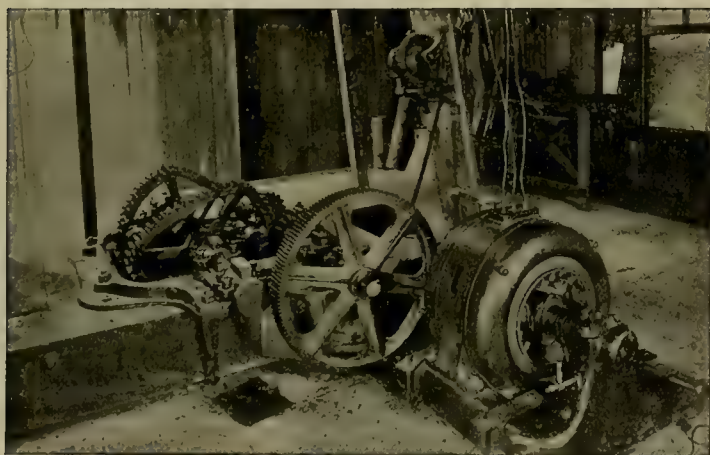
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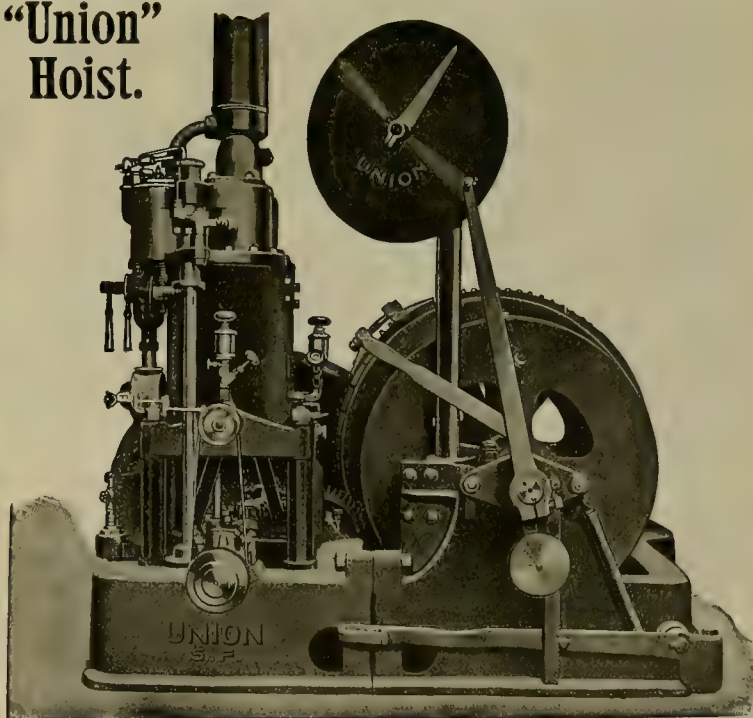
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By order of the Board of Directors.
ALEX. GRANGER, Secretary.
Office—Room 225 Crocker Building, San Francisco, California.

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CONSOLIDATED ST. GOTHARD GOLD MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Nevada County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 9th day of July, 1901, an assessment (No. 19) of ten cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 113 Crocker Building, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 12th day of August, 1901, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 24 day of September, 1901, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.
B. N. SHOBECRAFT, Secretary.
Office—113 Crocker Building, San Francisco, California.

EUREKA CONSOLIDATED DRIFT MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Placer County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 9th day of July, 1901, an assessment (No. 31) of one-half cent per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin to the secretary, at the office of the company, 214 Pine street room 31, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 15th day of August, 1901, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 24 day of September, 1901, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.
GEO. W. DIXON, Secretary.
Office—214 Pine street, room 31, San Francisco, California.

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DELINQUENT SALE NOTICE.

AMERICAN OIL AND REFINERY COMPANY.—Location of principal place of business, San Francisco, California; location of works, Contra Costa County, California.

Notice.—There are delinquent upon the following described stock, on account of assessment (No. 3) levied on the 28th day of March, 1901, the several amounts set opposite the names of the respective shareholders, as follows:

Names.	No. Cert.	No. Shares.	Amt.
Allen, S. L.	1170	12	\$ 60
Anderson, Mrs. Lulu	797	1,000	50 00
Anthony, J. C., Trustee.	798	1,000	50 00
Anthony, J. C., Trustee.	799	1,000	50 00
Anthony, J. C., Trustee.	800	500	25 00
Anthony, J. C., Trustee.	801	500	25 00
Anthony, J. C., Trustee.	802	500	25 00
Anthony, J. C., Trustee.	803	500	25 00
Anthony, J. C., Trustee.	804	500	25 00
Anthony, J. C., Trustee.	805	500	25 00
Anthony, J. C., Trustee.	806	500	25 00
Anthony, J. C., Trustee.	807	500	25 00
Anthony, J. C., Trustee.	808	500	25 00
Anthony, J. C., Trustee.	809	500	25 00
Anthony, J. C., Trustee.	810	500	25 00
Anthony, J. C., Trustee.	811	500	25 00
Anthony, J. C., Trustee.	812	500	25 00
Anthony, J. C., Trustee.	813	500	25 00
Anthony, J. C., Trustee.	814	500	25 00
Benecke, Diederich	93	1	05
Bergman, Mrs. Augusta.	712	85	1 75
Brown, Mrs. Ida M.	122	7	35
Buckley, Morris.	788	50	2 50
Carr, H. W.	719	5	25
Conn, Mrs. Sarah A.	529	20	1 00
Conn, Mrs. S. A.	530	25	1 25
Corbiers, C. C.	584	320	12 60
Corbiers, C. C.	585	5	25
Crew, L. T.	206	2	10
Cridge, A. D.	503	1	50
Cumberson, Mrs. Maria L.	171	14	70
Donnelly, Mary M.	49	10	50
Dunlap, Mrs. W. B.	526	10	50
Donahue, Benj. S.	1141	501	25 00
Bells, Charles P.	984	2,000	100 00
Bells, Charles P.	1127	10,000	500 00
Estey, J. C.	1045	100	5 00
Estey, J. C.	1046	20	1 00
Falls, Sarah.	557	40	2 00
Petrow, Mrs. Maria W.	172	3	15
Flak, Andrew J.	366	2	10
Freese, A. J.	6	40	2 00
Freese, A. J.	7	40	2 00
Freese, A. J.	9	50	2 50
Freese, A. J.	278	10	50
Freese, A. J.	279	10	50
Freese, A. J.	280	20	1 00
Freese, A. J.	281	20	1 00
Freese, A. J.	282	20	1 00
Freese, A. J.	283	20	1 00
Freese, A. J.	284	345	12 55
Freese, A. J.	450	20	1 00
Freese, A. J.	659	50	2 50
Freese, A. J.	671	9	45
Hildebrandt, Henry.	286	65	3 25
Hildebrandt, Henry.	287	100	5 00
Hildebrandt, Henry.	288	1,000	50 00
Hoover, John D., Trustee.	981	667	33 35
Hoover, John D., Trustee.	1060	433	21 65
Hoover, Miss Esther.	719	100	5 00
Holbrook, W. E., Trustee.	887	10,000	500 00
Holbrook, W. E., Trustee.	888	11,000	550 00
Holbrook, W. E., Trustee.	889	4,500	225 00
Holbrook, W. E., Trustee.	890	4,500	225 00
Holbrook, W. E., Trustee.	908	2,000	100 00
Holbrook, W. E., Trustee.	909	2,000	100 00
Holbrook, W. E., Trustee.	910	2,000	100 00
Holbrook, W. E., Trustee.	911	2,000	100 00
Holbrook, W. E., Trustee.	912	2,000	100 00
Holbrook, W. E., Trustee.	913	2,000	100 00
Holbrook, W. E., Trustee.	914	2,000	100 00
Holbrook, W. E., Trustee.	915	2,000	100 00
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Holbrook, W. E., Trustee.	929	2,000	100 00
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Holbrook, W. E., Trustee.	931	2,000	100 00
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Holbrook, W. E., Trustee.	934	2,000	100 00
Holbrook, W. E., Trustee.	935	2,000	100 00
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Holbrook, W. E., Trustee.	937	2,000	100 00
Holbrook, W. E., Trustee.	938	2,000	100 00
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Holbrook, W. E., Trustee.	940	2,000	100 00
Holbrook, W. E., Trustee.	941	2,000	100 00
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Holbrook, W. E., Trustee.	949	2,000	100 00
Holbrook, W. E., Trustee.	950	2,000	100 00
Holbrook, W. E., Trustee.	951	2,000	100 00
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Holbrook, W. E., Trustee.	1112	2,000	100 00
Holbrook, W. E., Trustee.			

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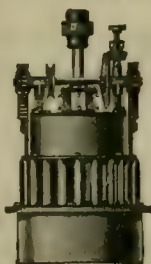
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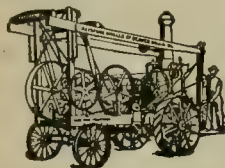


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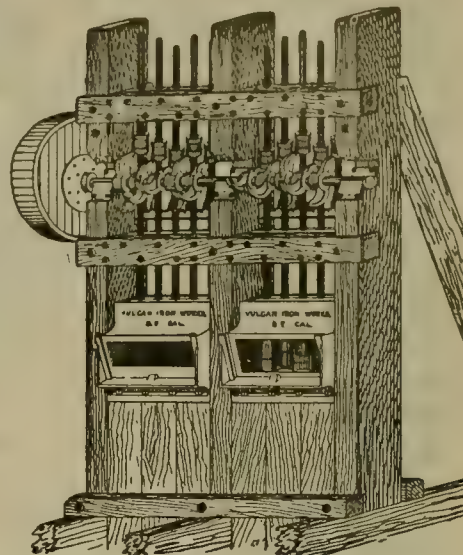
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WIRE ROPEWAYS

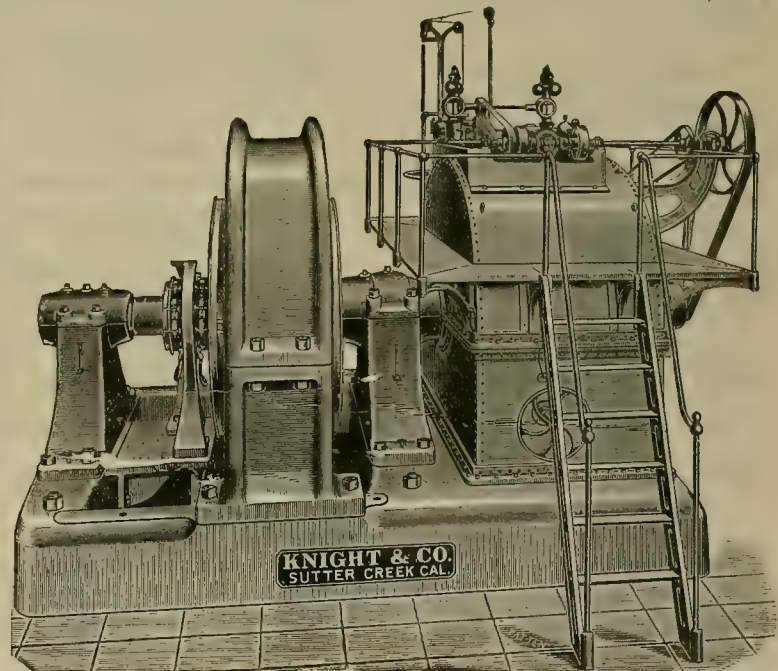
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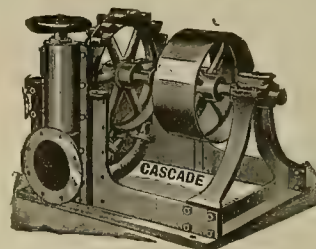
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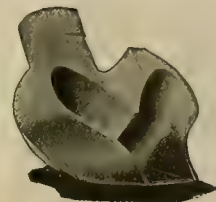
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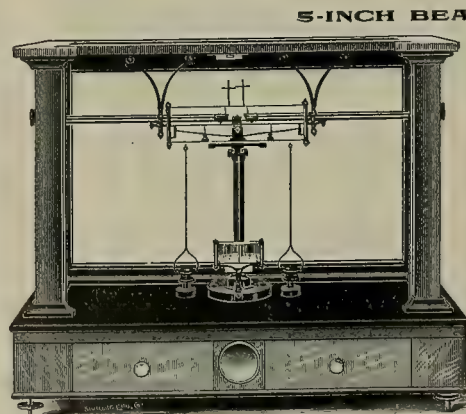
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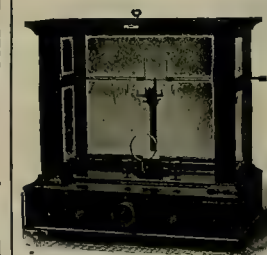
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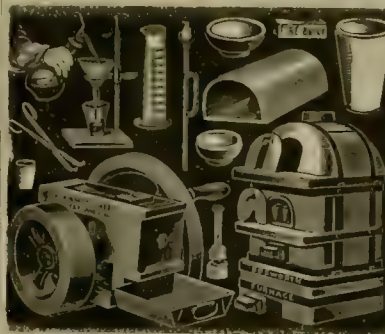


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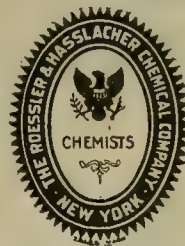


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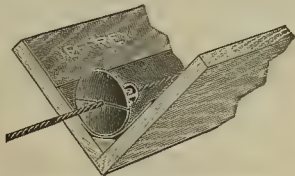
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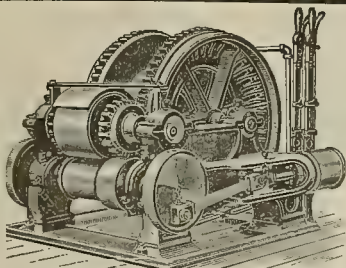
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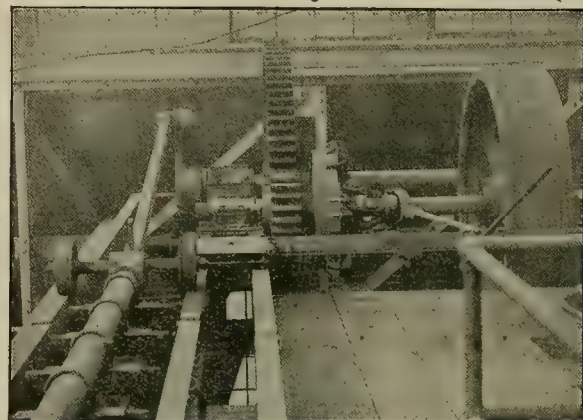
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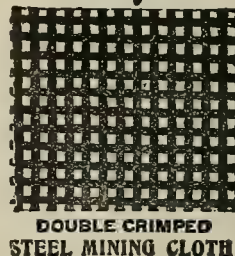
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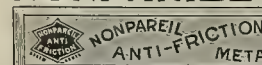
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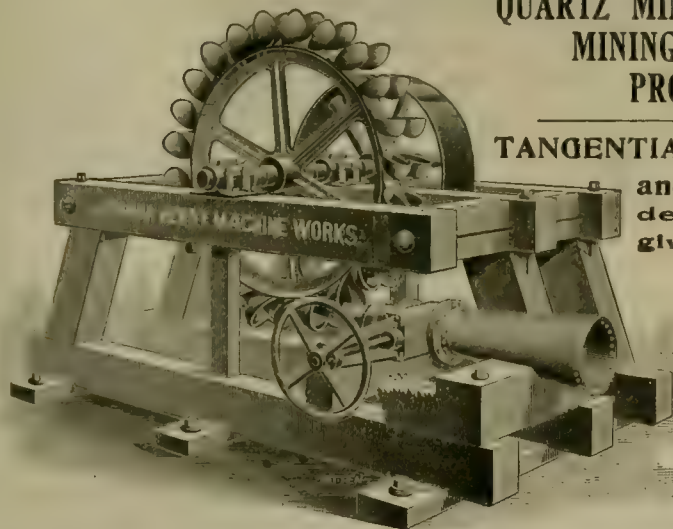
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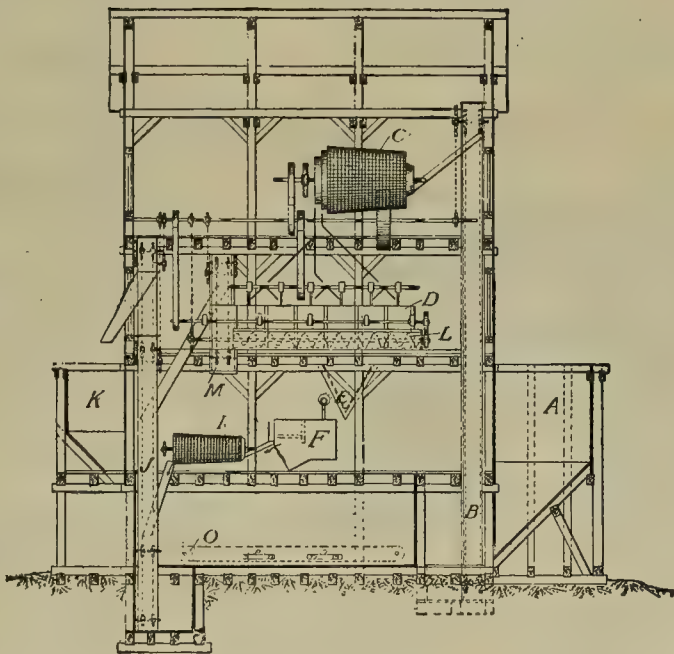
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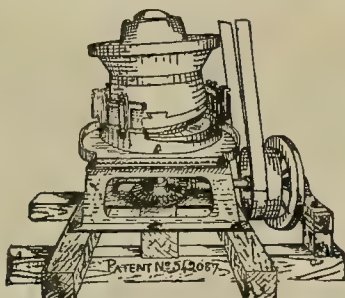
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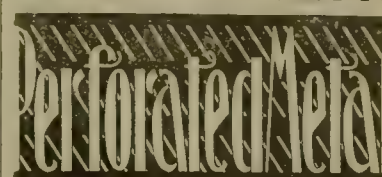
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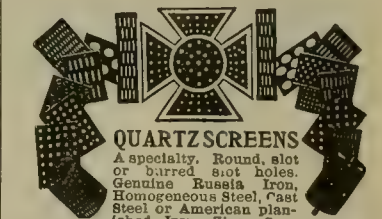
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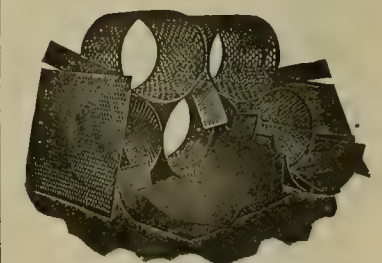
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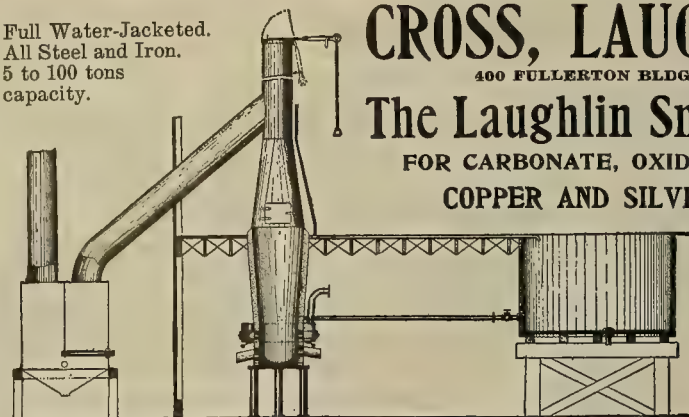
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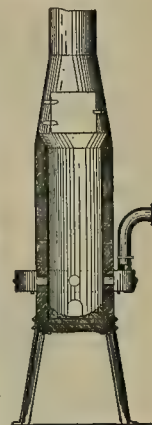
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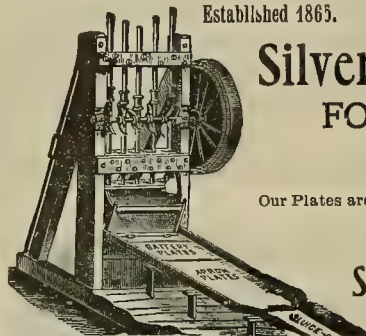
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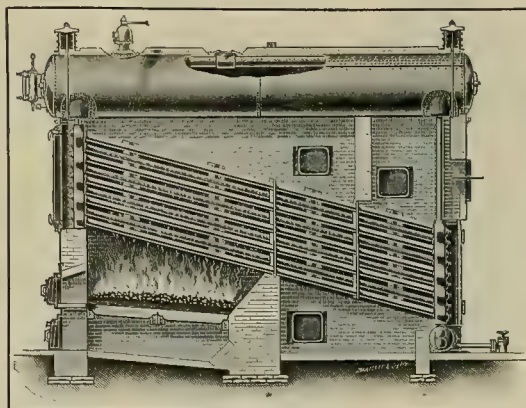
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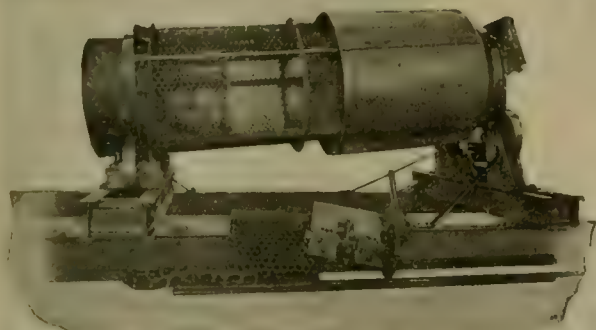
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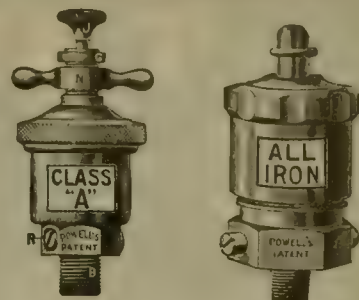
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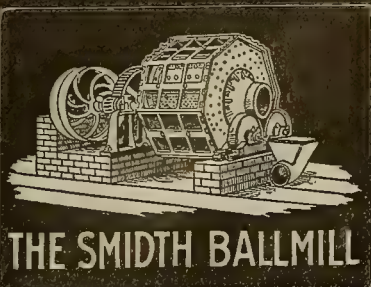
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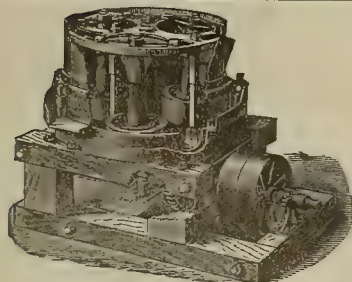
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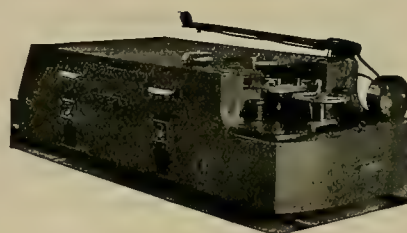
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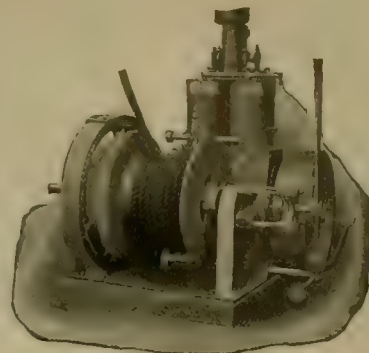
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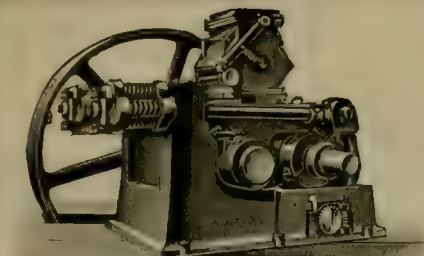


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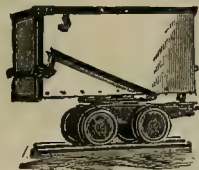
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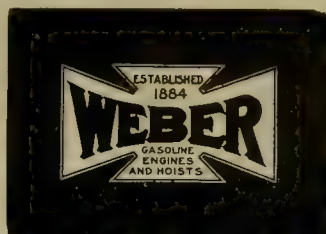
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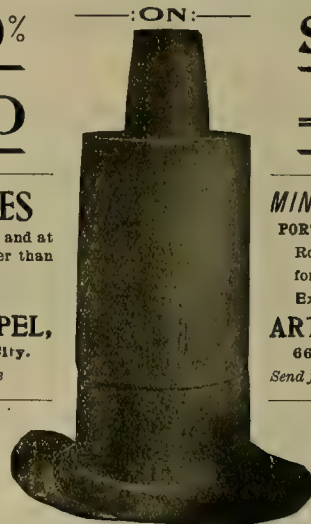
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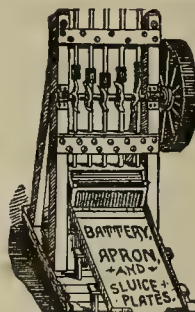
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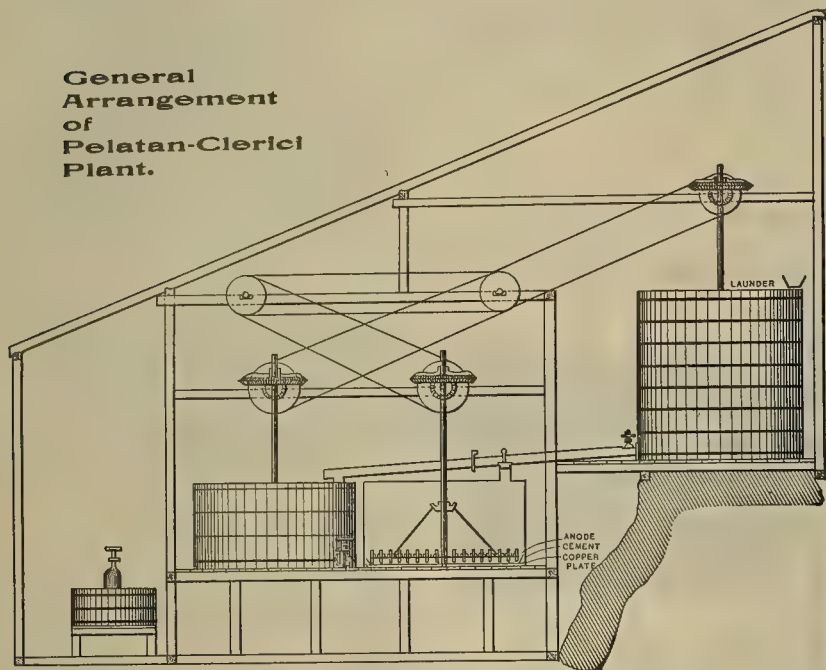
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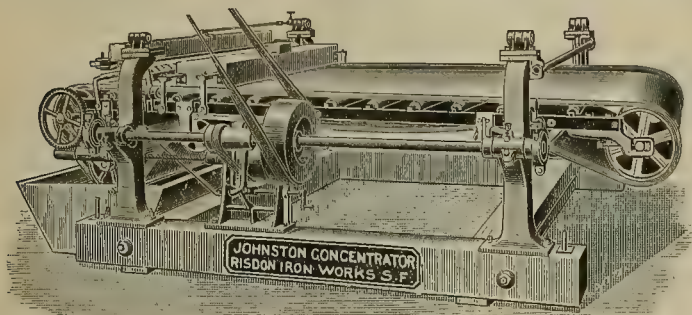


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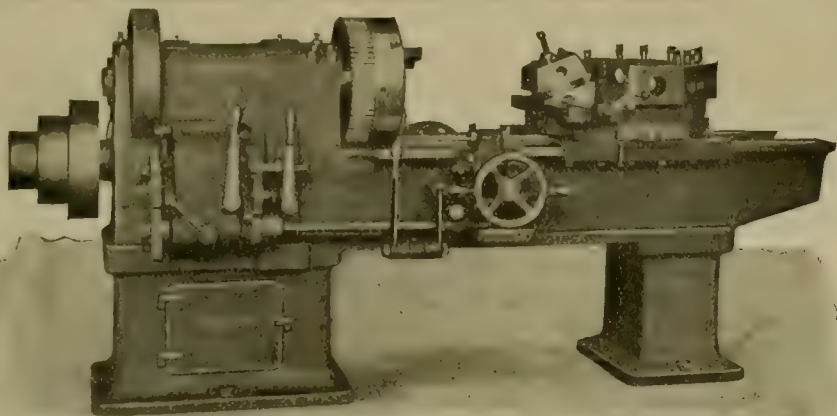


Fig. 1—Twenty-Inch Semi-Automatic Lathe.

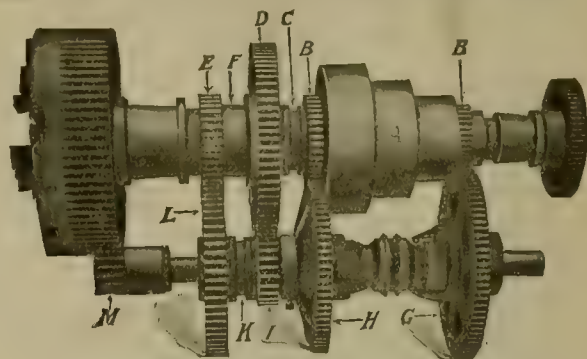


Fig. 4—Lathe Spindle, Cone, Chuck and Driving Gearing.

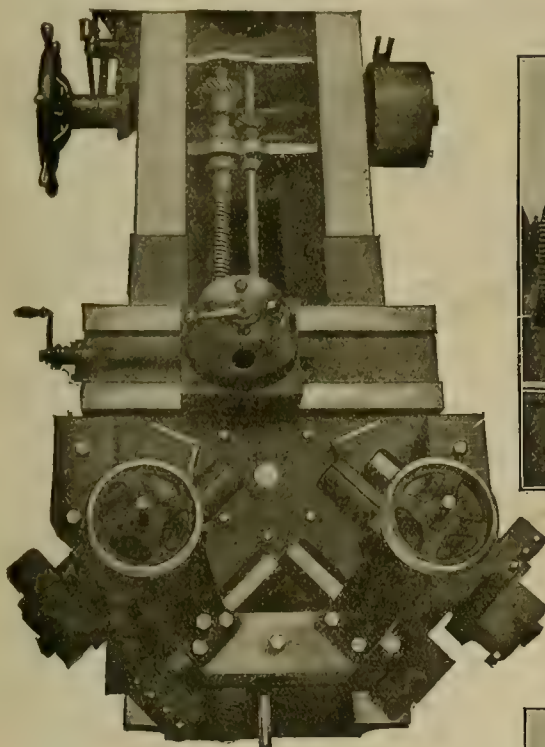


Fig. 2—Top View of Turret and Bed of 24-Inch Lathe.

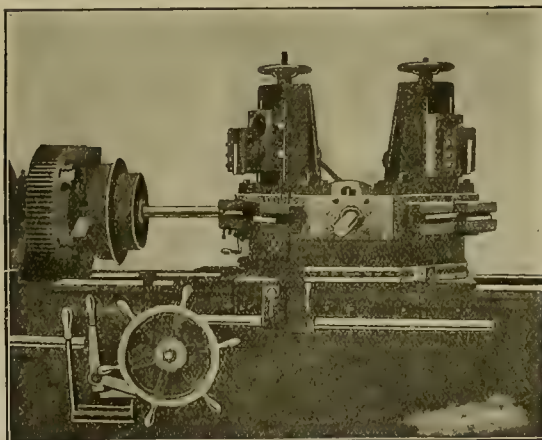


Fig. 5—Boring a Pulley.

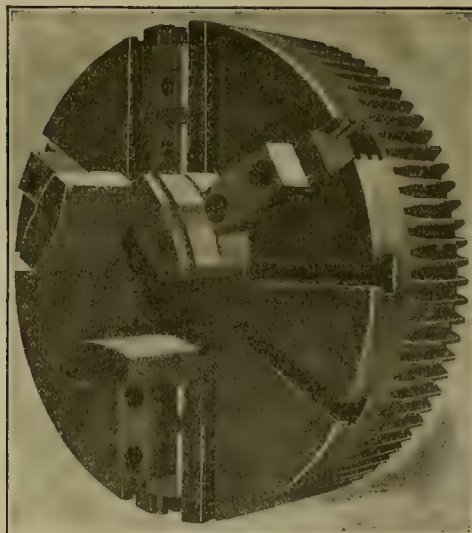


Fig. 7—Chuck with Special Jaws.

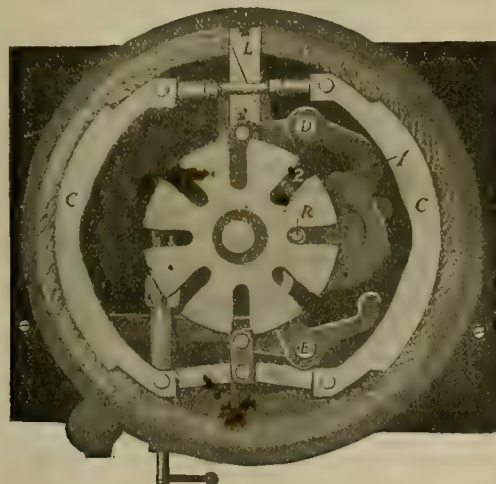


Fig. 3—Top of Carriage with Turret Removed.

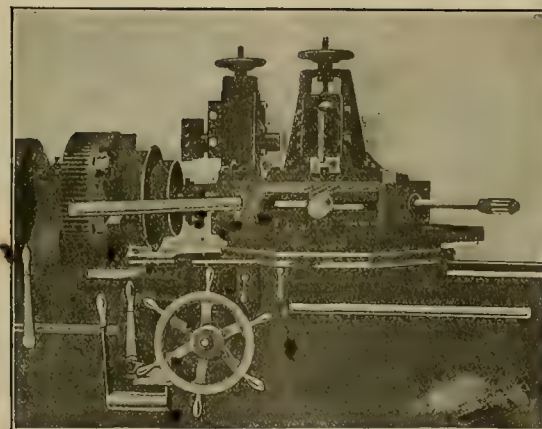


Fig. 6—Facing and Turning the Same Pulley.

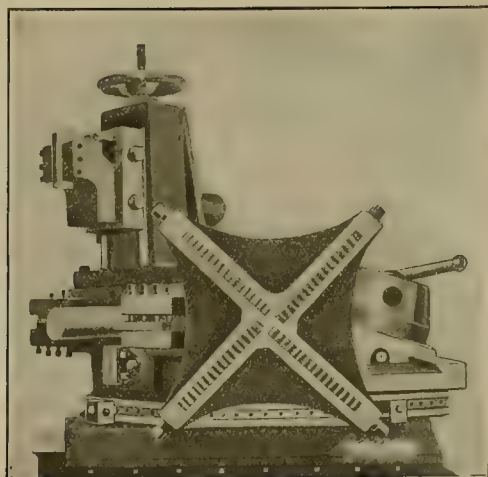


Fig. 8—Cutter Head Used as a Scale Breaker.

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San Francisco, July 27, 1901.

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A GRAND JURY at Nome, Alaska, has made a report in which it deals with some of the exceptional conditions under which mining claims are located and operated in the extreme northland. It recommends that Congress amend the mining statutes for Alaska by requiring twenty days actual labor on locations annually and that it shall be done the first year, and under some dates of discovery and location within sixty days after. More specific records of work done are recommended, also some minor details which will tend to prevent duplication and confusion of records. In the main the suggestions are proper. It would seem that they could be simplified, and probably the most effective aid that Congress could give in the matter would be such a local legal organization that the desired changes could be made rules for particular districts rather than general laws for all Alaska mining. People in Nome can hardly be expected to realize that southeastern Alaska has a much more moderate climate than Nome and mining conditions fairly are if anything much less severe than in some of the Rocky mountain country. The general mining laws of the United States can apply in southeastern Alaska without developing such abuses as are possible at Nome.

THE miners of Stockton, Utah, are considering a proposition to unite and jointly construct a tramway line and feeders from the several mines of that district to the main line of railroad. The idea is to make an economy in the present cost of team transportation. The feature that this paper regards as most important is the ownership of the tramway by the ownership of the mines. It is thus kept in its proper subordinate relation to the mining, and all the economy secured goes to the credit of profit of mining. Such operations are naturally part of mining feeders to its profits, and should not be permitted to become feeders off of its profits. Another proposition also under consideration by the mine owners of Stockton has in it the undesirable element of risk that the tramway proposition avoids. Outside capital is proposing to construct a drain tunnel permitting the mine owners to invest in the stock, presumably to a minority interest only. This involves the element of weakness, the necessity of an earning on stock as an investment in distinction from a cost charge for drainage. Either the drain tunnel is justified commercially or it is not. If it is it should be undertaken wholly at the cost of the mine owners as is any other detail of a single mine. If it is not justified it should not be constructed at all. The cost of the tunnel ultimately will have to be paid by

the production of the mines. There is no good business reason why its cost should not be written off against the production of the mines during the period of construction.

THE relation of the consolidated smelting interest to the mine owners as time develops the effect of the business policy of the former remains a matter of serious present consideration. It is clearly to be seen that very considerable economies have been effected in the business of ore reduction by smelting by the application of very simple means. Long-period contracts insuring ore supply and the ability to move the several varieties of ore to the particular plant needing them at the time have made it unnecessary to maintain enormous stock piles, locking up capital. In the aggregate several millions of capital of the smelting combination have been released and have become available for profit earning. The wicked Missouri lead miners who would unload all their cheaply produced lead at the high market rates maintained by the smelter combination, according to the statement of one of the high officials of the combination, have had the lion's hide removed and now appear to be side partners of the combination. The leading people in the combination are discovered to own a number of mines which take up or let out the slack in the general production. The miners who have high-grade ores are finding that they pay higher charges than formerly for smelting and refining, still they make something and are too busy in the present to feel much concern about the future. Low-grade ore mining in quantity is being stimulated by lower charges, made possible by the increased cost charges made against high-grade ore. So far as this low-grade production is gold it does not matter. So far as it is silver, lead or copper, it is a serious question if in extending production by reason of the bonus it gets from the high-grade ore production it is not tending to lower sale prices, which will ultimately react on the whole mining industry. It can not be seen how it will affect the profits of smelting, however, even if it does reduce the market value of mines both high grade and low grade. Another effect that is appreciable is that the business condition created has put the outside small smelter at a considerable disadvantage. The custom mills are similarly effected. The pressure is light as yet, but it is certain to increase. No one of these adverse to profit-earning conditions is by itself very considerable or very conclusive, but the aggregate of pressure they develop is considerable and the method is destructive. The value of mines is fixed not by the gross metal yield, but by the net after all cost charges are met. Clearly, the value of the mine will diminish as cost charges of ore treatment increase. Here, then, is the end to which the smelter combination tends. It will take business advantage of the reduced mine values to absorb the more desirable ones. There is nothing novel about the end. The old Comstock, Nevada, mining and milling by separate corporations were based on the same commercial idea, and the result of their operations was in a smaller way, in a smaller field of activity, precisely the end the present operation will produce, provided that mine owners generally in the meantime fail to protect their property interests by owning and operating their own reduction works.

THE Transmississippi Congress, in its late session at Cripple Creek, Colo., took an initiative to be commended and imitated. It passed a resolution recommending that its own organization and the organizations of the Irrigation Congress and International Mining Congress combine and in one organization, with a longer session, cover more thoroughly the ground divided between them. The spirit of the proposition is correct. Many of the objective points for which the organizations were formed yet remain unaccomplished. In proportion to intentions and magnitude of effort made, results have so far not been much from any of the conventions. The intentions and efforts have largely, but not exclusively, ended with resolutions. The local advertising and exploitation features, and civic rivalry in entertainments offered members, have tended to minimize the serious, practical objects of the separate organizations. These, in a measure, will be minimized by a combination of organizations and one Congress session for a longer period, but the possible springing

up of other needs to take their places must be guarded against. The disposition to magnify local issues by trades and combination among delegates must be restrained. The late convention very properly resolved that there should be a Secretary of Mines, despite the well-meant opposition illumination of a gentleman who protested that the States made mining laws so there was no use for the office. No one appears to have called attention to it, but the gentleman's protest of fact was really one of the weighty reasons why a National Department of Mines and a Secretary should be created. The State laws are one of the petty troubles of the mining industry. The national laws should be sufficient and their administration should be so intelligent as to do away with State laws altogether.

A PROJECT is on foot to consolidate all the producing oil companies in the San Joaquin valley, California, into one company, the object sought being to maintain the price at a profit-earning point. The general features of industrial combinations are to be followed. The new absorbing company is to issue its stock in exchange for the stocks of the existing companies, probably at valuations made by each company in its own interest. The promoters will presumably pay themselves by a stock commission additional which does not represent property. The result will be an inflation of nominal capitalization, already believed to be excessive in its relation to the real investment. The first effect of the organization on the industry will be the raising of the sale return of oil. But in raising this sale price it but adds an additional premium for producing wells outside the combination and a stimulus to the development of new wells. Not only is the sale price of oil raised for these outside wells, which have no excess load of capitalization to carry, but the organization itself must buy these outside wells to protect itself. It can not do this indefinitely with stock issues. The fact of the matter is that the economic idea on which this proposed organization is based is a false one. It is simply a postponement of the payment for the industrial evil it proposes to cure. This paper has pointed out the true economic line of action. The producers of oil should organize to increase consumption and to own the established business of consumption. This line of action, however, requires money. The mere exchange of paper certificates will not accomplish anything in it. Of necessity there can be no great stock allotments for promotion.

THE Canadian Pacific railway is reported as considering the substitution of electric power, developed from water powers, for steam for the portion of its line over the Rocky mountains. The commercial idea is the utilization of natural power now wasting itself uselessly and substituting it for a costly fuel consumption. Two conditions are making the scheme possible: first, the improvements in electrical power traction and transmission, and second, the lowering of the interest rate which makes the fixed charge on capital invested in water-power plants and the current cost of their maintenance less than current payments for fuel and its current charge for transportation till converted into power. In the United States there are mountain divisions of railroads where the substitution can be made. In California the crossing of the Siskiyou mountains on the California and Oregon division has the main Sacramento river, the Shasta river and the Klamath river as sources of water power that can be economically utilized; and the crossing of the Sierra Nevada mountains in Placer county by the Central Pacific overland railroad has paralleling it in the mountains the South Yuba and North Fork of the American rivers and the Truckee river.

THE Mining Congress, in session at Boise at the date of this writing, have adopted two resolutions that will meet with the cordial approval of all miners. The first is "that the magnitude and importance of the mining industry, which has now reached over \$1,000,000,000 of annual product, call for the establishment of a national department of mining, the chief of which should be a member of the President's Cabinet," and the second "that the Congress of the United States be respectfully requested to provide by law for the locating and working of mines of the reserved minerals—gold, silver and quicksilver—on Spanish and Mexican land grants."

Concentrates.

THE occurrence of platinum with a copper nickel ore at Bunkerville, Lincoln county, Nev., is reliably reported.

IN using forms for concrete work, a coating of soft soap prevents the concrete from sticking to the forms when they are removed.

IN the wet process of copper reduction the precipitation of cement copper from the sulphate in the solution consumes about 3740 pounds of iron to the ton of copper produced.

THE failure to record a notice of location of a mining claim within the time limited by statute does not render the location invalid where there are no intervening rights before the record is in fact made.

THE Secretary of the Interior has made a ruling in a Montana case, holding that a locator of a mining claim after having surveyed it for patent cannot hold it indefinitely without continuing the proceedings initiated and offering to pay for it.

GOLD can be precipitated electrically on a cathode plate from cyanide solutions, but it is not to be considered a commercial method of recovery, the technical restriction making the costs too high compared with other processes of reduction.

SHIPPING ORE from Nevada by an all water route to San Francisco is a commercial success. The mines are in the extreme southern part of Lincoln county, and the route is by the Colorado river to the Gulf of California and thence by sea to San Francisco.

LARGE sheet metal—steel or iron—water pipes are successfully manufactured and used. The largest size at present employed is 6 feet in diameter, but there is no engineering or mechanical objection to larger diameters. It is purely a commercial problem of comparative economy.

THE caliche formation of southern Arizona is not identical with the caliche of Chili, South America. The latter is the commercial source of sodium nitrate, containing sometimes as much as 50% of that salt. In genesis the two deposits are explainable by the same theory of drainage and evaporation.

KLONDIKE miners are preparing to make a legal fight for the recovery from the Canadian Government of the royalty paid on the gold production of 1898, on the ground that the grants from the Government, for which fees were paid, expressly stated that grantees were entitled to "all the gold taken from the claims."

OIL has what may be termed a selective faculty for minerals, attaching itself to some and having no effect at all on others. Generally it attaches itself to bright metallic particles and to sulphides. Some, however, it will not effect. Among the latter are blende and magnetite. There is opportunity for its use commercially in concentration.

THE maximum velocity of the water column in the drive pipe of a hydraulic ram rarely gets over 3.6 feet per second. In certain modifications of the hydraulic ram employed in air compression velocities up to 7.5 feet have been obtained in practice. There is with these higher velocities a positive gain in economy, but no higher rate of efficiency.

TWO CAST IRONS of distinctly different physical properties can exist and yet the chemical composition, as determined by analysis, can be the same. The explanation is the different allotropic forms assumed by the same element. Among the minor ingredients of cast iron carbon has three forms; silicon, sulphur and phosphorus have each two known forms.

THE Surveyor-General has repeatedly ruled that in surveying a mining claim for United States patent there can be no land included in the survey that is exterior to the marked lines of the location, regardless of the courses and measurements stated in the written location notice. The leaving out of survey of any portion of a location except a continuous line of lode is permitted on survey for patent.

WHERE it is necessary to use a wrench on a polished rod or shaft, the surface should be protected by a covering of wood to receive the jaws and bite of the wrench. A block should be split and sawed out with the grain to fit the surface of the metal to be held. Bolting the two halves firmly together furnishes a good place for taking hold with a wrench. There are no marks left on the metal after removing the block.

THE Supreme Court of Washington has decided that one corporation may not own the stock of another corporation nor vote the stock of another corporation in that State. The case arose in connection with the Tacoma smelter. The plant was owned by the Tacoma Smelting & Refining Co. Another corporation was organized, bought the majority of the stock of the corporation owning the plant, and then leased the plant to itself.

CEMENT OR ASPHALT applied to the outside of a wall will make it damp proof, if only surface water is to be protected against. The asphalt should be applied boiling hot. Its color is objectionable, but where covered it does not matter. The walls should be thoroughly dry if asphalt is used for coating, but it is desirable to wet them if cement is to be applied. A damp proof course in a wall can be made from slate, two thicknesses, with

overlapping joints, being used. Hot asphalt and coal tar can be used in the proportion of nine parts of the former to one of the latter. The layer should be $\frac{3}{4}$ inch thick.

IN tunnel or stope sets the collar braces or girts are a part of the set, and should be wedged tight with the cap and posts. It is almost impossible to wedge a set in most cases so as to hold in place and tight against collar braces or girts, without driving wedges from the face. Should the set be wedged so as to hold collar braces or girts in place, no amount of blasting in face can displace timbers without moving the timber in rear of set or breaking collar braces or girts.

THE standard wire rope consists of six outer wire strands and a hemp core. For special purposes the number of strands is decreased or increased. When the wire and strands are twisted in the same direction the rope is known as a "lang lay," when in opposite directions as a "regular lay" rope. The strands consist of seven, twelve or nineteen wires each. The value of a wire rope is measured by the service, which depends on care in the selection of materials and in the application of workmanship in the factory.

IRIDOSMINES present with placer gold are separated from it by melting with sufficient silver to reduce the specific gravity of the molten mass. The heavy infusible grains of iridosmine settle through the molten metal to the bottom of the crucible. The silver and gold can then be poured off, leaving the latter behind. Platinum can be fairly well separated from placer gold by panning carefully. If melted up with the gold, it renders the melting more difficult and the resulting bar of alloy harder to assay correctly.

IT is said to have been determined that the height of a brick stack is affected by the temperature of the escaping gas, the increase, when very hot, from the measurement when cold being 1 inch for every 25 feet of height. This expansion is wholly in the inside of the stack, where it is heated, and not at all on the outside, where it is not reached by the heat of the gases. In construction some provision should be made to take up this expansion, and the stack or chimney should not be built rigidly into building walls, but should stand by itself.

THE Nevada State trial court at Reno has rendered a decision on the law of extralateral rights that is a practical reversal of the one decision of the U. S. Circuit Court on the point, though the cases are not precisely alike. There has been no final adjudication by the Supreme Court of the United States establishing the rule. This last decision of the Nevada State Court held that the owner of the apex of a vein or lode on patented agricultural land had a right to follow the lode on its dip into an adjoining tract of patented agricultural land.

THE U. S. Government, in confirming the titles to what are known as Mexican grants under the Act of March 3, 1891, situated in all the land acquired from Mexico, except California, has undertaken to reserve the minerals exactly as reserved from the grants by the Mexican law. The resolution of the Mining Congress at Boise has reference to the minerals so reserved, for while they are expressly reserved to the Government, Congress has made no provision by law by which they could be appropriated, or title to them, or the right to mine and remove them could be obtained by individuals.

A ROUGH working rule for approximately calculating the horse power of water proposed to be used for power development is to multiply the number of inches of water flow by the height of the proposed fall divided by 400. This will give the power that can be developed on the water wheel shaft where the efficiency of the wheel is 80% or over. Thus for example with 2000 inches (50 second feet or 3000 cubic feet per minute) and a fall of 120 feet, the horse power developed would be $2000 \times (120 \div 400) = 3 = 600$. If it be desired to know the number of inches of water required to produce a stated H. P., the head or fall of water being given the calculation for 2000 H. P. required and 50 feet head would be $2000 \div (50 \div 400 = .125) = 16,000$ inches (400 second feet or 24,000 cubic feet per minute). The rule lends itself to rapid mental calculations.

THERE is no demand for a titanic iron ore. The commercial use of titanium is in alloys with iron, and steel, to which it either imparts certain desirable qualities directly or acts by removing certain undesirable constituents, as for example nitrogen. Experiments have been made indicating possibilities of economic value in alloys with copper and aluminum. The demand for all these uses, actual and prospective, is relatively trifling compared with the easily and cheaply obtained supply. It is a very common mineral in the form of the oxide. It is a not uncommon constituent of iron ores. In reducing the iron ores a small percentage of the titanium remains combined with the iron as an alloy, but most of it passes off with the slag. The fused metal is extremely hard, scratching steel and quartz, and extremely infusible, being much more infusible than chromium, tungsten and molybdenum.

THERE is no land owned by the State of California on which mining locations can be made. The State could not get known mineral lands in its selections, and if it did get them they would not be locatable. There is only one way to get a mine on land belonging to the State of California, and that is to buy the land from the State in conformity with the statutes provided. The State law of 1891, requiring record of assessment work, applies to

mining claims on public lands of the United States. The provision declaring a forfeiture for failure to record is not, however, operative. The State in the first place has no control over the title to public land of the United States in any form whatever. It only acquires the sovereignty when the United States relinquishes it by patent or grant in present. Neither can a forfeiture be declared for a failure to record if in fact the assessment work was done. That is to say, a forfeiture cannot be declared on an ex parte proceeding. The party affected has always his right to his day in court and the right to prove and have confirmed his possession. As a matter of fact, the State law requiring record of work does nothing more than to put parties on notice—and tax the right to mine.

IN building small reservoir walls out of such material as is most convenient, cobble and rock, if used, should be put on the outer slope of the dam, and not on the inside. Earth and clay should be placed on the inner face. Dump carts or scrapers can move material to place. The outside of the dam should preferably be kept highest, so that the material deposit is in wedge-shaped layers, the point being at the ground edge of the inner water face of the dam. Slopes for such dams should be inside 3 or $3\frac{1}{2}$ hor. to 1 vert. and outside $1\frac{1}{2}$ or 2 hor. to 1 vert. The surface of the ground on which the dam is to rest should be broken up first, so that the dam structure shall become incorporated with and there will be no seam for water flow. If a leak develop, it can generally be closed by dumping earth along the inside of the dam. The water leaking into the dam will carry the earth in and seal the opening. The preceding refers to dams not more than 10 or 12 feet high.

THE presence of a pay lead in the bed or old channel gravels of a stream above the bedrock, and clearly separated from a pay lead on the bedrock by a stratum of barren wash, is due to the fact that continuously for a long period of time the stream made the level of the pay lead the base level of its erosion and at no time subsequent cut below it. It will be noted that the gold in such upper levels is much more evenly sized, more regularly distributed and in much smaller grains and scales than the gold of the bedrock pay lead beneath. This is a necessary consequence of the relative age in the erosion history of the channel, dating from the time of derivation of the gold from its rock matrix in place. The gold of the upper lead is much the younger, so considered, and is farther, in all probability, from its lode source. The curious phenomena of an upper lead above the bedrock, with no bedrock pay lead beneath, is sometimes presented. Under such circumstances, it is desirable to prospect the bedrock itself, particularly if soft and seamy. If gold is not found in it, the bedrock pay lead is one side or the other, and not far removed vertically.

IN digging a ditch the use of a templet form insures correct and well finished work and an economy of labor. The templet is constructed from four pieces of $1'' \times 3''$ or $1'' \times 4''$ batten stuff. The bottom piece is made the exact length on the lower edge of the bottom width of the proposed ditch. The top piece is made the length on its bottom edge of the top width of the ditch plus the distance of the beginning of the cut from the line of the survey grade pegs. These two pieces are placed parallel and apart, the distance between bottom edges equal to the depth of the ditch cut below the grade peg line. The two sides are then firmly nailed in place on the proposed angle of slope completing the frame, the extra length of the top piece being at one side. A plumb line is then fastened to the top piece and hanging free with the top set horizontal, the point the plumb bob touches on the bottom piece is marked with a nail. Using the templet the end of the extended top piece is made to rest on the grade peg, the frame entering the ditch excavation which is not finished until the plumb bob hangs over the nail. The floor of the ditch must then be uniformly deep enough and level and the banks of the cut must have the proper slope. Care is of necessity taken that no unnecessary excavation shall be done outside of the limits of the designed dimensions.

THE essential element of assessment work through which it effects its object, the protection of the claim from forfeiture, is the actual performance of the \$100 value of labor and improvements on or for the claim by or under authority of the owner of the claim. Who gets the benefit of the work when it is done depends on the circumstances, but some one gets it and the claim does not become forfeit. If the owner does the work himself, or pays the men who do it, he gets the benefit. If a bondee or leaser does the work, it is for the owner's benefit. If the bondee does not pay for the work after it is done, the owner gets the benefit of it. But if the workman has a lien for his work, he may by due legal process dispossess the owner and acquire ownership himself. The owner of a claim can protect his title from becoming liable for payment for the work done under a bond by posting a notice on the claim, in a public place, declaring that he will not be responsible, nor will the claim be responsible, for payment of work done under lease. Verbal notice to the parties doing the work, if given before any work unpaid for has been done, has the same legal effect, but the written notice is preferable. In the State of California the recording of the bond with the proper covenant as to who should pay for work done under it is legal notice to workmen that the owner of the claim is not responsible for payment for work done under it. A part owner can protect his separate interest by a notice.

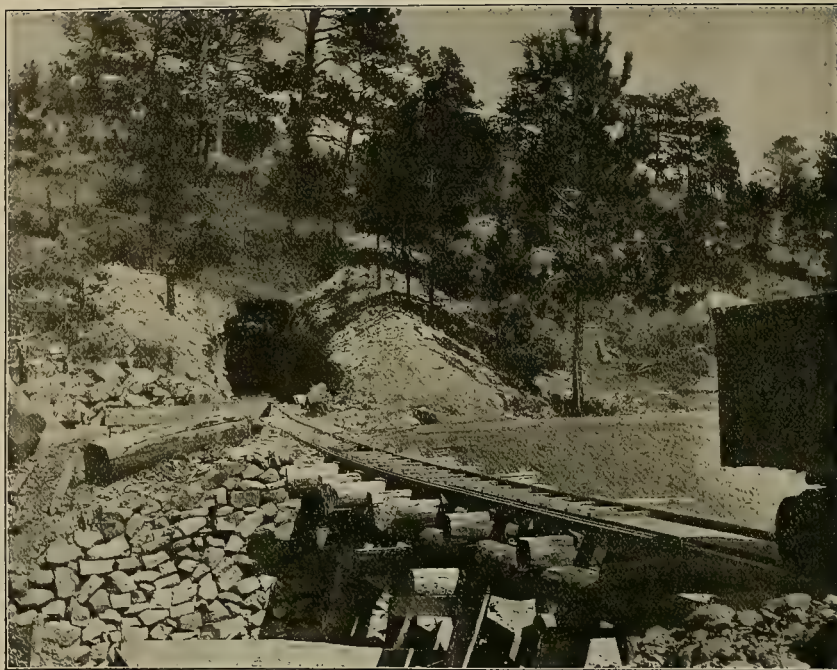
Sapphire Mining, Yogo, Montana.

Written for the MINING AND SCIENTIFIC PRESS.

The sapphire mines of the Yogo mining district, Fergus county, Montana, are recognized as being among the most valuable gem mines of the world. The great dike in which these gems are found is itself an interesting study for the geologist. Beginning at the western extremity of the known vein, $1\frac{1}{2}$ miles west of Yogo creek, in bodies of massive grey limestone, the dike extends almost due east for a length of more than 5 miles. The vein is remarkably regular, both in size and in yield of gems.

The eastern, or lower, end of the lode is exposed in a small basin on the eastern slope of the Little Belt range, about 10 miles west of the town of Utica and 2 miles north of the Judith river. Here the New Mine Sapphire Syndicate have their lower workings, and from this point to the top of Yogo hill, 3 miles distant, can be noted the great cuts, shafts and other workings that expose the dike. From the top of Yogo hill, and continuing west across Yogo creek, the American Gem M. Co., P. J. Sweeney superintendent, owns the vein for $1\frac{1}{2}$ miles, and for the greater part of that distance it has been exposed by cuts, shafts and drifts.

The New Mine Sapphire Syndicate, C. H. Walker manager, is operating the properties first discovered on the vein. The greater part of the workings of the New Mine Syndicate are surface openings and much of it has been done by ground sluicing and hydraulicking. The water supply is brought to the



Tunnel Entrance on Sapphire Lead, Yogo, Montana.



Hydraulic Mining for Sapphires, Yogo, Montana.

mine from Yogo creek through a ditch and flume 10 miles in length, and a system of sluicing works extends over the entire length of their present workings, and is paralleled by a pipe line for hydraulicking. The oldest workings were begun in 1896, and are about 1 mile east of the summit of Yogo hill. Here there are several great open cuts on the vein, one of which is 700 feet in length and has an extreme depth of 90 feet. Just east of this cut is the Blue Diamond cut, having a length of 1200 feet and varying in depth from 20 to 50 feet, with a width of from 8 to 20 feet. In addition to these are several other large cuts, and a tunnel in one place has been driven 600 feet, having a depth at the face of at least 200 feet. The vein at the surface, and sometimes to a depth of 50 feet, is much decomposed and hydraulicking is sufficient to work it for that depth, but in the tunnel the vein rock is hard and requires powder to break it.

The body of the dike is a basic igneous flow, somewhat brecciated near the surface and having much the appearance of the micaceous schists common to several mountain ranges of this region. Near the surface the rock has many colors, with red, yellow and brown predominating. With depth these give way to a light blue and green or a dark grey, with the latter color predominating. A very fine section of the vein is seen in the face of the Blue Diamond cut, which is about 35 feet high and shows all the gradations of the vein stuff from the surface to the depth where the hard rock is encountered. In the most easterly workings the lode has been opened at a point very little above the level of the Judith river valley. Here it appears in a new formation, as the walls exposed in the cut are of a soft, shaley material, much different from the hard limestone higher

up the hill. The rock of the lode is also different, the entire body strongly resembling the ordinary basalt, but the value in gems is equally as great here as elsewhere.

On the American Gem M. Co.'s property the vein matter is all broken out by powder. These mines have been bonded at \$50,000, although the company has been in active operation but ten months. Several hundred feet of development work has been done. Near Yogo creek, on the east side, a great lime cliff rises abruptly from the valley to a height of 400 feet, and in the face of the cliff can be seen the walls marking the width of the vein where it has eroded between the harder formations composing the walls. Into this cliff a tunnel has been driven from the valley bottom at a depth of nearly 400 feet, and the vein is strong and well defined at this depth.

The method of extracting the sapphires from the rock matrix is much similar to that used by placer miners in sluicing for gold. Sluice boxes are fitted with Hungarian riffles, as in placer mining, but it is necessary to exercise more care in setting them, as the specific gravity of the sapphire is much less than that of gold, and with boxes set at too great a pitch they would pass over the riffles and be lost. When first extracted the vein stuff is passed over a grizzly (screen) and the finer parts pass at once into the sluice boxes. The coarser, harder material is thrown into a dump, where it weathers and disintegrates, and is then washed through sluices. The process of disintegration occupies from one month to a year, according to the hardness and tenacity of the rock. Superintendent Sweeney of the American Gem Co.



Open Cut on Sapphire Lead, Yogo, Montana.

assists the disintegration of his dumps by turning a flow of water on them occasionally, and by this means the hardest of the vein matter is ready to pass through the sluices in two months. For cleaning up the ordinary rocker is used, with three screens of as many sizes, through which the pay dirt is passed. When the pay dirt has been worked down as closely as possible with the rocker it is panned in one of the finer screens, dried and the stones picked by hand from the small amount of gravel remaining. All the stones are saved, the larger perfect ones being valuable as gems, the smaller ones being used as watch jewels and in other fine mechanical work. The imperfect ones are ground and mixed with diamond dust and used in gem cutting and polishing. The stones of the Yogo vein vary in size from sand grain size to four or five karats weight, and as gems they equal in value the best products of the mines of Ceylon and Burmah.

The largest stone yet found in the American Gem Co.'s mines was taken from the Fourth of July claim and weighed eight karats, and one taken from the New Mine Syndicate mines weighed a little more than nine karats. The stones are very equally distributed throughout the vein, but are less broken and somewhat better formed in the deeper workings, although some of the most valuable stones yet found were from the surface. The sapphire color is blue and the shade known as corn flower blue is the most highly prized. Occasionally stones very nearly approaching the ruby are found in the vein, but they are usually imperfect and worthless as gems. The gems produced in the New Mine Syndicate mines are sent to lapidaries in New York and London for cutting, while those from the American Gem Co.'s mines are cut by lapidaries in Helena.

The illustrations on page 34 will give a very intelligible idea of these unique gem deposits and the simplicity of the methods of exploitation required to obtain the gems. There is a difference of detail rather than essentials in comparing the methods of exploitation with diamond mining as followed in South Africa. There, as here, the matrix of the deposit is in an eruptive rock, which weathers and disintegrates, freeing the gems on exposure to the air. The diamond-bearing rock requires a somewhat longer time for this air slacking to complete itself, however. The subsequent separation by water and hand picking is quite similar.

Butte, Montana, Ore Treatment Notes.

[STAFF CORRESPONDENCE.]

The ores of Butte district, at present working depths, are very little oxidized and contain no carbonates. The iron carried by them varies a great deal in percentage, but a general average would doubtless be about 16%. The siliceous material runs 55% to 60%. In practice the ores of the district are separated into two classes—first grade, that goes to the smelters direct, and second class, that is concentrated before smelting. The first grade constitutes approximately 15% of the tonnage mined and will average 12% copper. The 85% of the output that is milled will average 4.8% copper. By concentration the 55% or 60% of silica is reduced to 15% or 20%.

The only change in concentrating methods made here within the last two or three years is in the greatly increased number of jigs used, by which a coarse jig product is made that goes direct to the smelting furnaces.

At the Butte & Boston concentrator mine water is largely used for mill work, but first the larger percentage of copper it carries in solution is precipitated by old iron. At this mill the slimes that finally pass from the tables are settled in a slime pond. A considerable amount of these slime settlements is taken up, dried and used to line the copper converters at the smelters. It is the intention to briquette this material when a sufficient amount of it has accumulated. The Butte & Boston Co. handle about 22,000 tons of ore per month, about 18,000 tons of which are concentrated before smelting.

The Missouri River Power Co. of Helena proposes to transmit electric power from their Missouri river plant to Butte, a distance of 100 miles, and furnish power at the mines for hoisting, air compression and mill work. It is announced that they will charge \$50 per horse power per year. It is also stated that within six months the Butte Light & Power Co will be ready with a similar proposition. The latter generate their power at Big Hole river, 30 miles southwest from Butte. It all means a reduction in the tonnage of coal used for steam purposes and a lessening of the cost of operating.

A concentrating table invented by J. H. Michelsen, but in charge of Miller Borglum, is being tried at the M. O. P. concentrating mill. In many respects it resembles a Wilfley and Cammett, but has a motion that is the distinctive feature. Its longitudinal vibration is imparted by an eccentric and a system of toggles, giving the table a quick, intermittent motion that attracts the interest of concentration men.

Butte, Mont., July 13.

Semi-Automatic Turret Lathe.

On the front page is illustrated a new lathe designed for machine castings and forgings, a semi-automatic turret lathe built by the American Turret Lathe Co., Wilmington, Del., and manufactured in sizes ranging from 20-inch swing to 40-inch swing. The latest design in this series is the 20-inch lathe shown in Fig. 1, which, while slightly different in appearance from the larger sizes, has the essential features of the others. In all sizes, small as well as large, the carriage is rotated, indexed, and clamped by power, and has a rapid travel to and from the work in addition to the slower power feed which is thrown in when the tool approaches the work. This feature has made it possible to construct machines much more massive and for machining heavier work than was possible where the turret, necessarily heavy and massive, had to be manipulated entirely through the muscle of the operator.

In Fig. 2 is a view looking down upon the turret of a 24-inch lathe, showing the lathe and part of the feed mechanism for giving the rapid movement of the carriage along the ways of the lathe and for rotating the turret. At the back of the bed (at the right in the illustration) are three pulleys. The middle one is fast on its shaft, the outer and inner ones loose on the shaft and carry open and crossed belts, like the pulley of a planer drive. When one or the other of the belts is shifted onto the tight pulley, by means of a belt shifter operated by a handle at the front of the machine, the shaft is given a rotary motion one way or the other, according to which belt is driving. The shaft in turn drives the large, coarse-pitch feed screw that extends longitudinally between the ways of the lathe, and the nut in which this screw turns is attached to the under side of the carriage. When the carriage is to be moved rapidly along the ways the drive is through this mechanism; but if a slow feed is desired, the lead screw is driven by means of bevel gears and intermediate shaft and spiral gears from a shaft on the front of the bed. This arrangement enables the operator to control the carriage as perfectly as though moved by hand, and more rapidly.

Motion to the turret-turning mechanism is transmitted through the shaft running parallel with the feed screw in Fig. 2, and it is driven by means of spiral gears, in a manner similar to that employed for driving the lead screw. These gears receive their motion through a pinion keyed to the hub of the inner loose pulley and run continuously as long as the belt is on this pulley.

In Fig. 3 is a view of the top of the carriage with the turret removed, and showing the mechanism for turning, indexing and clamping the turret. There are cams, S, directly over a vertical shaft which is driven continuously by the shaft and gearing just referred to and shown in Fig. 2. The shaft turns in the direction of the arrow and the cams can be made to turn with the shaft by a clutch mechanism which can be thrown in by the handle at the front of the carriage (shown at the bottom of the illustration). The upper cam plate carries a roller R, which comes in contact with the sides of the radial slots of the disk at the center of the mechanism and turns the latter, giving the rotary motion to the turret. The mechanism is a modification of the familiar Geneva stop motion. The office of the cams is to operate the indexing slide L and the clamping device which holds the turret securely to its seat when the cutting tools are operating. The order of operations is first to release the turret clamps, then withdraw the indexing slide, rotate the turret, move out the index slide and finally clamp the turret.

The indexing slide L is operated through the bell crank lever pivoted at D. The end of the slide is notched with a V-shaped notch to fit hardened steel index pins inserted in the under side of the turret. The slide L is withdrawn by the cam striping at point I of the lever and is moved to place again by the cam coming in contact with the roll 2 on the opposite arm of the lever. The slide L is cut diagonally into two parts, which are connected, but between which a small amount of motion is possible. The tendency is thus to wedge the slide L tightly between the sides of the groove in which it slides, and so prevent lost motion.

The action of the cam plate upon the lower bell crank lever in the operation of the clamps is similar to the action just outlined. The clamps C C are pivoted at their upper ends, and their lower ends are moved in or out through the action of the bell crank lever on the toggle motion shown. The outer edges or peripheries of the clamps are grooved their whole length with a single V-shaped groove. The lower flange, which forms the lower side of the groove of the clamp, fits under a projecting flange of the carriage, while the upper side or flange of the clamp fits over the corresponding projecting flange on the under side of the turret. When the clamp is moved out, therefore, its upper and lower flanges draw the turret flange and the flange of the carriage tightly together.

The driving gear of the lathe headstock is shown in skeleton form in Fig. 4, and is an interesting study in mechanism. There are six changes of speed for each step of the cone, all under the control of the

levers at the front of the machine (Fig. 1), and any of the speed changes can be made while the machine is in operation. The feature of the mechanism is that only one shaft, besides the spindle, is required to produce the various speed changes. The cone does not drive the spindle directly, the connection between the two always being a geared connection.

The power feed mechanism of these lathes is obtained through an ingenious train of gearing inclosed in a feed box at the headstock end of the machine. Twelve changes of feed can be obtained by the movement of levers which control sliding featherers, causing any one of a number of gears to do the driving.

The capacity of the machines of this character depends largely upon the arrangement of the turret and the method by which the various tools are held. The turret of these lathes is low and of large diameter, and embodies features that adapt it to an unusual number of operations at one setting of the tools. There is no cross slide upon the ways of the lathe, all the tools for that purpose being carried by the one carriage on which the main turret is mounted. Referring to the plan view (Fig. 2), it will be seen that there is a cross slide mounted on the main turret, which turns with the turret and carries a small auxiliary turret capable of holding four tools. This small turret has an independent power cross feed and is designed primarily for facing or for doing other work where a cut is to be taken with a single pointed tool.

The main turret has five vertical faces, two of which are long enough for three large holes in each face for holding tools, and three of which are shorter and contain one hole each for boring and reaming tools. Fixtures or tools can also be bolted directly to any of the turret faces. On top of the two larger sections of the turret are bolted housings carrying tool slides that can be fed in a vertical direction by the hand wheels, as illustrated in Figs. 2, 5 and 6. The varied uses to which an outfit of tools can be put is indicated in Figs. 5 and 6. In Fig. 5 a pulley is held in the chuck of the machine and is being bored. For the second operation the turret is turned two notches, skipping the left-hand set of facing tools shown in Fig. 5, bringing the boring bar that extends toward the front into position for taking the second or finishing cut. Skipping one face of the turret, as was done in passing from the first to the second boring tools, is no objection with this lathe, because the turret is operated by power, and no extra effort is required on the part of the operator. After the second boring tool has passed through the pulley the next face of the turret is skipped, bringing the reamer into position. This reamer is shown in Fig. 6. In all the boring operations, where it is feasible, the end of the boring bar passes through the hole in the casting, and is supported by a bushing inserted in a recess in the center of the chuck. The same practice is followed in turning, especially when a heavy facing cut must be taken. In Fig. 6 the tools are just approaching the position for turning. The facing cutters are advancing to the work to square the end of the hub of the pulley and true up the edge of the rim. A tool carried by the housing or bracket on top of the turret is also advancing to turn off the first pulley face, after which it will square up the flange between the two steps of the pulley. The finishing cut is taken by the set of tools appearing on the central face of the turret in Fig. 6. In this view the bar for supporting the pulley while the two facing cutters operate upon it is clearly visible. One advantage of a tool operated by a vertical slide is that it can be raised over any projection and brought down on the other side where necessary to finish that side.

In Fig. 7 is shown a method used in these works for adapting the chuck to pieces of various shapes. This chuck is a combination universal chuck, with three jaws and a fourth independent jaw. The projecting portions of the jaw are cast iron pieces bolted to the parts that slide in the body of the chuck. These cast iron jaws can be made of any size or shape, and they are milled in a fixture so that they are interchangeable.

Another special arrangement is the roughing out cutter illustrated in Fig. 8. The difficulty in facing large cast iron surfaces with a broad facing tool is in breaking up the scale. After this has been accomplished there is but little trouble in finishing the casting, even where the cut is several inches wide. The tools for this purpose, shown in Fig. 8, consist of a series of Mushet steel tools held by set screws in the slots of the four-armed holder. Where one of the series of tools fails to cut beneath the scale the next one is almost certain to do so, and by the time a point on the casting has made a few turns past all four arms of the cutter there is little likelihood of any of the scale remaining.

The Parke & Lacy Co., 23-25 Fremont street, San Francisco, are the Pacific coast agents for these lathes.

THE town of Davos, in Switzerland, proposes to dispense with fuel of all descriptions and to resort to electricity for all industrial and domestic purposes. The project is to erect an electrical generating plant at the confluence of two large mountain torrents. Swiss electrical engineers have been studying the possibility of the scheme for several months, and now state that they are in a position to undertake the

work. The cost of the first installation, it is estimated, will be \$1,700,000. Already electricity is extensively employed for cooking, heating and lighting in several villas, while one of the largest bakeries in the district is electrically equipped in every respect. [The proposition in this project to be realized by the use of water power is identical with the suggestion of this paper to the producers of petroleum in California.—Ed.]

The Formation of Bonanzas in the Upper Portions of Gold Veins.*

NUMBER IV.—CONCLUDED.

BY T. A. RICKARD.

CALIFORNIA.—In California, especially in that mining region which follows the foothills of the Sierra Nevada and traverses the counties of Amador, Calaveras and Tuolumne, the occurrence of pockets of rich ore, full of native gold, is a notable feature of the superficial parts of the quartz veins. These pockets appear to be confined to the zone between the surface and the water level, and to be dependent upon the results produced by the small cross veins which encounter the main lodes. In 1887 I had the pleasure of extracting, in two hours, a little over 170 ounces of gold, worth about \$3000, from one of these pockets. It was at the Rathgeb mine, near San Andreas, in Calaveras county. The main lode consisted of 5 to 8 feet of massive, "hungry-looking" quartz, the foot wall of which was a beautiful augite-schist and the hanging a hard diabase. The water level was 160 feet below the surface. Down to this point the country was oxidized, the hanging wall exhibiting only slight alteration, while the schist of the foot wall was softened and decomposed almost to a clay. This was traversed by numerous small veins, which appeared to act as "feeders," forming bunches of rich ore where they encountered the main lode. At the 120-foot level, south from the shaft, there were some old workings; the examination of these led to the discovery of a small seam, about one-sixteenth of an inch thick, filled with red clay which carried a good deal of native gold, as was proved by washing it in a pan. An experienced miner was put to work, with instructions to follow this small streak. It varied in thickness, and occasionally opened out into small lenticular cavities, containing a clay in which the gold was distributed like the raisins in a pudding. Each of these pockets yielded several hundred dollars' worth of gold. At length the streak widened to 6 or 8 inches of quartz, lined with clay. The red clay commenced to increase; coarse gold became more frequent, and a big discovery was hourly expected. It was finally made. The vein suddenly became faulted, and at the place of faulting there was a soft, spongy, wiry mass of gold and clay—more gold than clay. The first handful I broke, while yet the stope was thick with powder smoke, contained three ounces of gold. Within the next two hours this pocket gave us \$3000, and during the following week it yielded



Occurrence of a Pocket.

over \$20,000, an amount which was obtained at a total cost of less than \$200. When it had been worked

out, it was easy to observe the conditions which determined its occurrence at this place, as Fig. 2 will explain. The vein, AC, had been faulted about its own width, namely, 10 inches, by a small cross seam, DE, and at this intersection, B, the pocket lay. The gold was spongy and was intermixed with quartz. The clay which penetrated the whole mass was partly red and ochreous, and partly a gray gelatinous material. In the quartz, and associated with the gold, there were acicular black crystals of pitchblende (uraninite) together with uranium ochre. This association of gold with uranium is uncommon.

NEW ZEALAND.—Intersections which coincide with enrichments form a notable characteristic of the Hauraki gold field in the north island of New Zealand. In this district the occurrence of patches of native gold is an important feature of the regular mining operations. When I was there, in 1891, each stamp mill had its "specimen stamp," a single stamp working in a separate mortar, and employed solely for the treatment of specimen ore. These rich patches occur at the places where the "reefs" or lodes cross bands of flinty quartz. The latter are known among the miners as "flinties." They vary in thickness from a few inches to mere threads of chalcedonic quartz. They are barren in themselves, but have a favorable effect on the gold veins. The latter are also intersected by cross veins, producing an enrichment similar to that caused by the "flinties." Fig. 3



Enrichment at Intersection Moanataeri Mine, New Zealand.

is a sketch of one of these intersections, as seen by me in the Moanataeri mine. The lode, AB, consists of a series of small seams of quartz, conforming to the structural lines of the enclosing country, which is hornblende-andesite. The cross vein, CD, is a band of soft, gray, decomposed rock, which also carries a number of small quartz seams, but only near its crossing with the main lode, AB. The line of CD is parallel to a large fault, to be seen elsewhere in the mine workings. The "leaders" or quartz seams in AB are gold bearing, and exhibit marked enrichment at the intersection with CD.

The prevailing formation of this mining district is an andesite, which is traversed by soft bands of decomposition, called "sandstone" by the miners. The latter, when penetrated by quartz seams, are favorable to the finding of ore. The gold occurrence is essentially sporadic and dependent upon local enrichments, such as have been described. The district is surrounded by thermal springs, and is near the well known volcanic region of Tarawera, which was active in 1884. The mine waters are heavily mineralized and very acid, so that the metal screens used in the mills are quickly corroded. Tellurides and selenides of gold have been detected in the ores; but the precious metal is usually found native and in coarse particles, which are frequently coated with native arsenic. The district is one which, I think, if thoroughly examined, would afford many suggestions regarding ore deposition.

CONCLUDING REMARKS.—It is to be hoped that the recent recognition of the agencies which bring about the formation of enrichments by surface waters will not cause too violent a swing in the direction of a sweeping advocacy of the general efficiency of descending solutions to form ore bodies. The study of the problems of ore occurrence has been hindered in the past by such reactions from one extreme view to the opposite. Therefore, in concluding this contribution to the discussion of the results produced by descending surface waters, I would emphasize the wider agency of ascending solutions in forming the ore masses amid which such secondary enrichments are occasionally found. It is agreed that the sulphide ores are primarily deposited from ascending waters; it is also likely that such a result is repeated. A region once subjected to fracturing, which has permitted the subsequent passage of mineral-bearing solutions, is likely, at a later period, to be subjected to a repetition of these activities. The geological history of many mining regions gives clear evidence of a repeated disturbance of structure. This is indicated by the existence of several systems of fractures crossing each other, the later ones dislocating the earlier. It is probable that each period

was marked by mineralization, the character of which may have varied. The banded arrangements of the lodes of certain districts, such as Freiberg, Rico and Butte, suggests this. Enrichment may have been caused by mere addition; the introduction of other metals may have changed the average composition of the ore in the lode so that it is now extremely valuable, whereas before it may have had no economic importance; a silver ingredient may have been added to the gold contents, or the addition of copper may have made a deposit doubly valuable by improving its metallurgical character. I hope the present discussion on ore deposition will prove as inspiring to further investigation as did Posepny's paper of 1883, and that data concerning the possible secondary enrichment of sulphide ores by the repetition of ascending solutions will be sought for. There is nothing like a working theory to sharpen the observation. Theories do not alter facts, but they often lead us to find new ones.

In cordially welcoming the splendid treatise of Prof. Van Hise I need make no reservation. When Posepny made clear the essential character of the upper or "vadose" water circulation, he did us a great service; and when he combated "lateral secretion" he overthrew a very narrow interpretation of ore formation, which was calculated to hinder seriously our progress toward the understanding of these difficult problems. But Posepny was carried so far by his controversy with Sandberger as to overemphasize the sole agency of ascending currents. At that time, in 1893, I demurred to this extreme view and said, "The word circulation is the key to the whole matter." By this I meant that the entire underground water circulation played a part in the formation of ore, and that to swing from one portion of that circulation to another, restricting oneself to the agency of either, would not (so it seemed to me from experience in the mines) solve the problem.

It does not appear to me that Prof. Van Hise has erred by exaggerating any particular view of the subject. His elucidation of the water circulation as a complete system is based on a broad conception of the whole matter. Of course, in indicating the work done by an agency hitherto largely overlooked, he was compelled to place some emphasis on certain neglected features of the descending portion of the water circulation, and thus to give it some prominence in his masterly analysis. This makes the consideration of the question of secondary enrichments by surface waters one of the most valuable parts of his treatise.

Regarding this question of secondary enrichment, it is to be pointed out that all ore deposits are "secondary," the ore as found by the miner being merely the last term of a series of solutions and precipitations through which its substance has passed in a constant shifting due to the underground water circulation. However, the last stage of the journey is the only one of immediate importance to the miner; and the determination of the causes which brought it there is, to him, far the most interesting aspect of the general inquiry. That Mr. Emmons should also have investigated and illuminated the problem is a matter of much pleasure to a great many engaged in mining throughout the West, to whom his geological contributions have always seemed to possess a practical bearing and value unfortunately not always found in scientific descriptions of geological phenomena.

The California Mining Statute of 1891.

TO THE EDITOR:—The editorial in the Chronicle of this date, under the head of "A Muddle in the Mining Laws," is a violent assumption of existing conditions, based upon an erroneous view of the law. There is nothing in the part of the Act of 1891, therein referred to, which can create an "immense (or any) amount of trouble" in the sense indicated by the writer of that article. The purpose of providing for the filing of an affidavit of annual labor or assessment work is to furnish record evidence thereof, and to make the same prima facie evidence of the same. Such affidavit, being inadmissible in evidence, in the absence of such a statutory provision, Judge Hawley well says in *Book vs. Justice Mining Co.* (58 Fed. Rep., 118), while construing a substantially similar Act of the Legislature of Nevada:

The Act does not prevent, and was not intended to prohibit, the owner of a mining claim from making the necessary proof in any other manner, nor does it prohibit the contesting party from contradicting the facts stated in the affidavit. The statute relates not to the effect of doing the work or making the improvements as required by law, but to the method of preserving prima facie evidence of the fact that such requirement has been fulfilled. There is no provision in the statute to the effect that failure to comply with its terms will work a forfeiture, and the statute is not susceptible of any such construction. Forfeiture of a single mining claim cannot be established except upon clear and convincing proof of the failure of the locators or owners of the claim to have the work done or improvements made to the amount required by law.

It necessarily follows that, if the assessment work be done upon a mining claim, the failure to make and record proof of such labor under the Act of 1891 will not work a forfeiture of the claim. Hence there does

*Trans. Am. Inst. M. E., Richmond meeting, February, 1901.

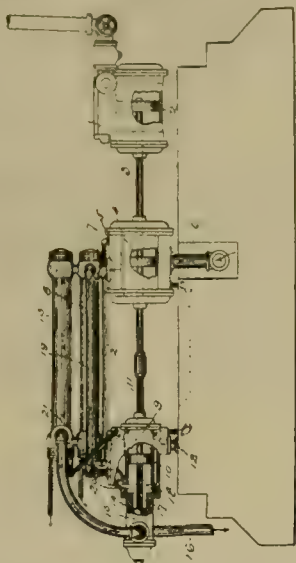
not seem to be any room for the creation of the serious condition sought to be shown in said editorial; nor does any good reason appear why the Act should be repealed, as suggested by that paper. Such action would merely serve to inconvenience and make it more expensive to the mine owner in proving the essential fact of the performance of the annual work upon his claim.
A. H. RICKETTS.
San Francisco, July 22.

Mining and Metallurgical Patents.

Patents Issued July 16, 1901.

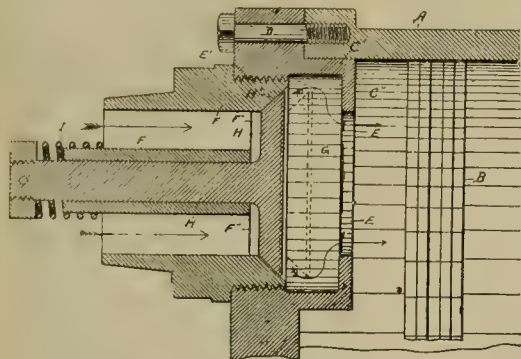
Specially Prepared for the MINING AND SCIENTIFIC PRESS

AIR COMPRESSOR.—No. 678,487; E. Hill, South Norwalk, Conn.



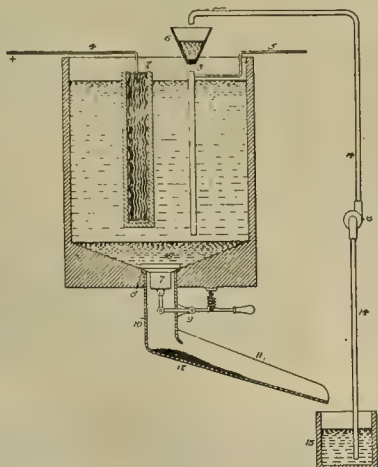
A cylinder with a single-acting piston, a cooler, a duct connected with chamber on active side of piston and extending through cooler and a duct connecting chamber on inactive side of piston with cooler duct before it passes through cooler.

AIR COMPRESSOR.—No. 678,839; C. B. Little, Dayton, Ohio.



A compressor cylinder, a head secured thereto projecting into the cylinder and providing chamber adapted to contain valve and into which a valve is movable, an opening in head forming communication between cylinder and chamber, diameter of such opening being essentially smaller than diameter of valve, so that in event of a breakage of valve it will not be permitted to enter cylinder, a valve casing mounted in head, the valve casing and valve forming outer limit of chamber.

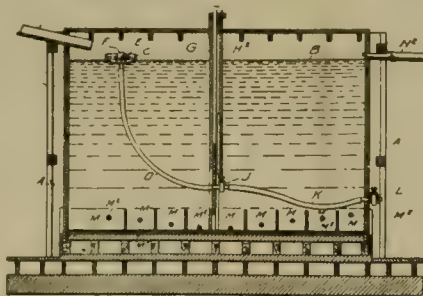
PROCESS OF RECOVERING ZINC.—No. 678,816; A. J. Shinn, Philadelphia, Pa.



The process of recovering zinc from solution of any

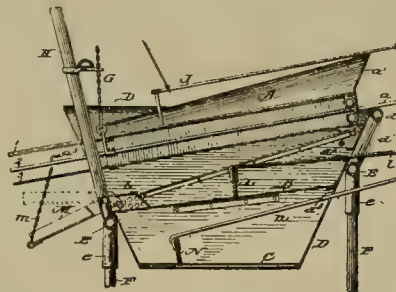
of its compounds, consisting of electrolytically decomposing solution, collecting zinc thrown out as an amalgam upon a stream of mercury flowing over a metal plate, separating thick or pasty amalgam from surplus mercury and liquid amalgam during operation of process, and returning liquid to be used repeatedly.

ORE SIZER AND CLASSIFIER.—No. 678,551; J. O. Dimmick, Denver, Colo.



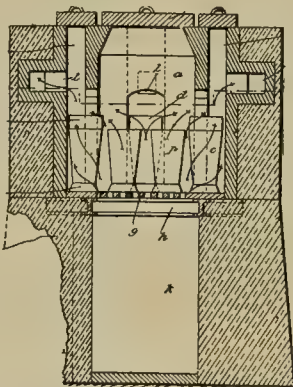
In combination with an ore classifier, a skimming disk adapted to float, and comprising a concave bottom, a central exit therein connected to flexible valved conduit, disk being provided with perpendicular rim provided with perforations at intervals in circumference; a table supported by legs over central exit to receive weight or weights whereby depth of submergence of skimmer may be governed.

ORE WASHER AND SEPARATOR.—No. 678,819; C. V. Watkins, Vinegar's Landing, Wash.



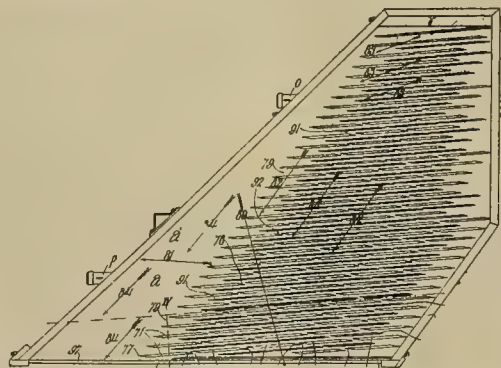
The combination with a rectangular supporting frame, having pins on front bar, of hopper, adapted to fit therein and having arms d' attached to its front end, and provided with sockets to receive pins, and inclined braces extending from sides of frame to upper angle of hopper, whereby hopper is held immovable but adapted for convenient detachment.

CRUCIBLE FURNACE.—No. 678,674; O. Michael, Freiburg, Germany.



A crucible chamber, means for heating furnace having a grate, niches in walls of chamber for reception of crucibles to be preheated, having floors on same level as grate and channels leading from outer walls of niches.

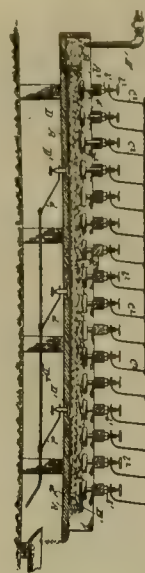
ORE CONCENTRATOR.—No. 678,793; L. Look, Los Angeles, Cal.



A table furnished with riffles extending obliquely across table and arranged coaxially in rows lengthwise of riffles, with open spaces between ends of riffles, and being also arranged parallelly in rows ex-

tending obliquely from feed end toward discharge end of table, with spaces between sides of riffles, and means for shaking table diagonally of riffles.

APPARATUS FOR THE RECOVERY OF GOLD FROM CYANIDE SOLUTIONS.—No. 678,526; C. P. Stewart, Oakland, Cal.



A relatively long horizontal trough, means for supplying solution at one end, a partition near receiving end of trough for distributing solution, a retaining partition at discharge end of trough to retain solution in trough to desired height, a body of quicksilver in bottom of trough between partitions, a series of anodes supported above body of quicksilver, in path of flowing solution, and suitable electric connections with anodes and quicksilver.

The Doetsch System of Copper Reduction.

The process of sulphatization of the raw copper ores at the Rio Tinto mine, Spain, has been partially replaced by the Doetsch system, which substitutes for the roasting a chloride reaction, based upon the action of ferric chloride upon the chalcopryrite. At contact of the ferric chloride the sulphides of copper are transformed into chlorides, while the iron pyrite is not attacked. The ferric chloride separates the copper from the combination without dissolving the iron. The solution containing the chloride of copper is then treated by iron, which precipitates the copper cement.

The solution of ferric chloride is obtained by dissolving salt in ferric sulphate; sulphate of soda and ferric chlorides is thus formed.

To apply the Doetsch process, a commencement is made by crushing the ore to less than 1 centimeter (0.39 inch) size, which is then mixed with 2% of salt and ferric sulphate, the whole being then heaped in piles 4 meters (13 feet) high by 15 meters (48 feet) long and 15 meters wide. Horizontal and vertical openings are made for the circulation of air and water. Upon the summit of the pile a platform is constructed, from which water is distributed uniformly throughout the mass. The water filtering through the ore dissolves the salt and sulphate of iron, which react upon each other, thus producing ferric chloride; the solution attacks the sulphides of copper and, dissolving them, is drained into tanks, where copper is precipitated in the form of cement by means of pig iron and old rails. The consumption of iron is about 1100 kilograms (2420 pounds) per one ton of copper. The cement holds from 80% to 85% of copper.

The waters from the cement contain ferrous chloride, and in order that it may be used again, it is essential to regenerate the ferric chloride. For this purpose, the water is raised by means of pumps, lined with hard rubber, and passes into a tower filled with fragments of coke, through which a current of chlorine ascends, which is produced by the action in reverberatory furnaces of chloride of sodium upon sulphate of iron in the presence of excess of oxygen.

The chloride transforms the ferrous chloride into ferric chloride, which is again employed for solution.

The washing operation lasts about two years; at the end of this time there remains but one-half of 1% of copper in the ore. The Doetsch process has the great advantage of suppressing the fumes of sulphurous acid, which formerly denuded the country about Rio Tinto. It diminishes much of the expense of the iron necessary for the cementation and consumes only marine salt and sulphate of iron, both of which are procured easily and cheaply.

According to Mr. Cumenge, the expense of manufacture of copper of cement per ton is as follows:

Dissolving.....	\$16 04
Cementation.....	34 93
Miscellaneous expenses.....	5 40
Total.....	\$56 37

MINING SUMMARY.

Specially compiled and reported for the
MINING AND SCIENTIFIC PRESS.

ALASKA.

NOME.

(Special Correspondence).—All of the dumps in this district which were drifted out during the winter have been washed out and have generally proven very satisfactory to the owners. Owing to the extreme lateness of the season, sluicing has but just begun upon the creeks and gulches and there is some uncertainty as to the production of this short season. It is believed that Ophir creek, in Council City district, will prove richer than Anvil. There are many rich spots in Port Clarence and Koogerack districts, but so little real mining has been done in these districts at this writing, one cannot judge accurately as to their real values. There is the usual stampeding to the Arctic and Fair Haven districts, but up to this time no reliable information has come from those districts. So far this season there have arrived at Nome about 6000 chechakas (new comers) and about 2000 "sour doughs" from Dawson. The chechakas, as a rule, look despondent, and many will return. The weather has been very disagreeable for about a month—rained nearly every day and the sun has appeared but few times in thirty days. Quite the reverse of last year, when we had about six weeks of almost continuous sunshine. There is still some mining on the beach—probably 500 men between Penny and Nome rivers, working mostly the new ruby sand thrown up by the heavy storms and some of them are meeting with very good success. D. H. JACKSON.

Nome, July 12.

Nome Mining district has been divided, the old Bonanza district having been practically re-established with the recording office at Port Safety.

A. Allen, of Spokane, Wash., proposes to mine the Nome beaches with a submarine dredge which, from tests made by him, he believes will prove a success. G. Liebes, of Spokane, Wash., is associated in the enterprise.

FORTY MILE.

W. H. Young, a miner of Forty Mile, says that there will be a great development of properties in that district during the present season, despite the difficulties of getting into it with provisions and outfits. Claims on Montana and Confederate creeks are paying from \$8 to \$10 a day to the pick, and with the number of men at work a large output of gold will be made, even though no greater strikes are made.

JUNEAU.

W. Matlock is doing the development work on sixteen hydraulic claims on Glacier creek discovered last summer.

KETCHIKAN.

To the westward from the Mount Andrews group, on Kasan Peninsula, Prince of Wales Island, is situated the Flemming copper property, now owned by the White Eagle M. Co. The ore is very similar in appearance and value to the Mount Andrews. I. Goldsmith of Kasan is the company's manager.

ARIZONA.

GILA COUNTY.

The Clipper group of copper mines has been bonded by a Richmond, Va., company, represented by W. H. Mercer. There are several hundred feet of development work on the claims, the principal opening being a crosscut tunnel 230 feet long, with a 30-foot winze. H. M. Chance, M. E., of Philadelphia, Pa., is preparing plans for its development, which will be commenced at once.

The Cole & Goodwin copper mines, 16 miles southwest of Globe, have been bonded for a year to a St. Louis company represented by G. P. Andrews, manager of the Pinal Copper Co. Of the price of \$35,000, \$4000 was paid. The claims are developed by 1000 feet of shaft, tunnels and drifts. The ore is chalcopryite, running from 4% to 8% copper.

The cost of copper produced by the original Old Dominion Co., as shown by the books, was: Mining expense, including development work, 1.79 cents; smelting expense, including coke and fluxes, 3.41 cents; general and office expense, 0.51 cent; total cost per pound copper produced, 5.71 cents. The figures cover the average cost for twenty-four months to June, 1895. The records of the old company show that the average ore smelted carried from 10% to 12% copper and that the loss in the slag was from 1½% to 2% copper. The present company smelts ore averaging about 9% copper and the loss in the slag is about the same, that is, from 1½% to 2% copper. The present management, however, is now saving at least 1% copper from the slag, which, with the reduced cost of coke

of over 50%, puts the present company in a position to produce copper for less than 5 cents per pound at the mines.

MARIOPA COUNTY.

The Acme S. & R. Co. are completing plans for a custom smelter at Wickenburg, and expect to be putting machinery into place at an early date.

G. B. Upton, manager of the Oro Grande Co., at Wickenburg, reports the finding of very coarse gold ore in the shaft 215 feet down.

MOHAVE COUNTY.

Grading at the Minnesota mine, near Kingman, for the installation of a 100-ton dry concentrating plant is being done.

PIMA COUNTY.

Anderson & Davis, of Denver, Colo., have bought the Twin Butte mining claims, 30 miles south of Tucson, and it is said that they are planning to build a smelter in Tucson to treat the ores.

CALIFORNIA.

The gold production of California counties for 1900 as compiled by the State Mineralogist is as follows: Amador, \$1,373,788; Butte, \$485,589; Calaveras, \$1,649,126; Del Norte, \$3483; El Dorado, \$368,451; Fresno, \$22,346; Humboldt, \$109,444; Kern, \$805,252; Lassen, \$19,807; Los Angeles, \$5508; Madera, \$104,134; Mariposa, \$157,663; Mono, \$670,200; Nevada, \$1,802,036; Orange, \$2407; Placer, \$986,155; Plumas, \$365,210; Riverside, \$149,292; Sacramento, \$176,007; San Bernardino, \$247,949; San Diego, \$335,937; Shasta, \$733,467; Sierra, \$659,696; Siskiyou, \$951,397; Stanislaus, \$21,212; Trinity, \$571,605; Tulare, \$10,445; Tuolumne, \$1,596,891; Ventura, \$2562; Yuba, \$280,366. There was \$972,185 "unapportioned." The total of gold was \$15,863,355. Twenty counties are not directly credited with gold production.

The copper-producing counties are credited with output as follows: Amador, \$34,100; Calaveras, \$150,585; El Dorado, \$500; Kern, \$750; Madera, \$77,500; Nevada, \$20,472; San Bernardino, \$297,600; Shasta, \$4,166,735.

Of quicksilver Colusa county turned out \$1500, Lake county \$127,345, Napa \$403,500, San Benito \$180,000, San Luis Obispo \$23,886, Santa Clara \$241,073, Sonoma \$99,500, Trinity \$105,982.

AMADOR COUNTY.

It is reported that several rich pockets have been taken out in the Oneida mine on the 1800 level.

The George Upton mine, about 6 miles northeast of Plymouth, is said to be showing up well. The tunnel for 200 feet shows a continuous ore shoot, which will run from \$12 per ton upward.

The Wheeler mine, near Plymouth, has been bought by the owners of the George Upton mine. The mine has a 20-stamp mill. Besides a large gold-bearing porphyry dike, there are two quartz veins on the property.

BUTTE COUNTY.

The County Supervisors' Board of Equalization reduced the assessors' valuation of gold dredging lands from \$175 an acre to \$65 an acre.

The Hazelton mine, formerly the Carlyle, near Forbestown, is to be opened up. T. C. Mayon, the Supt., says the shaft is down 250 feet, with 300 feet of drift at the 200-foot level. There is a 10-stamp mill on the property.

CALAVERAS COUNTY.

The Boire Bros.' mine at Railroad Flat is being developed by C. W. Curtis under a working bond. W. W. Cook is Supt.

The Jones mine, located at Glencoe, has been bought by the Fanny Marie G. M. & M. Co. Brown & Co. of Boston, Mass., have been opening up the property, with F. O. Cortmarsh Supt. The new company has discarded the old works and put in a new hoist and pump.

The Emma mine at Campo Seco, owned by McSorley Bros., has closed down temporarily, having reached a depth that the present machinery can not work to advantage. New machinery is being put in.

Men have been put to work at the Beatrice mine, near Murphys. A new hoist is to be put up.

EL DORADO COUNTY.

Work has been resumed on the Pyramid mine, near Placerville. New machinery and a new mill are to be put up.

The South Sligo mine, near Spanish Dry Diggings, has started up with C. W. Keeney as Supt.

J. M. Nougues, Jr., has started work on the lower tunnel to tap the ledge in the old Josephine mine, at Volcanoville.

Operations have been resumed on the Alpine mine at Georgetown.

NEVADA COUNTY.

J. Clark of Cisco, who has been prospecting and mining at Meadow Lake, believes the rebellious ore of that district will soon be successfully reduced. There

is now at Cisco a 10-stamp mill to be shipped into the district.

The old Locklin mill, near Nevada City, and the Bulldozer mine have been leased to S. B. Weeks and C. J. Bryant, who propose to operate the property.

Supt. H. Morris of the Yuba mine at Mayburt says the ledge has been showing up well. With twenty-five men the 15-stamp mill has been kept running steadily. The water is being pumped out of the shaft.

A party of miners have leased the Gold Blossom mine at Grass Valley from R. Jeffrey and have commenced work on it. The lease is for twenty-one months and is held by J. Northway, H. Green, C. Nettle and J. Rowe.

The financial report of the Truckee River General Electric Co. for the fiscal year ending June 30, 1901, shows total gross receipts of \$69,374.29, of which \$60,455.18 was received from the Comstock, Nev., mining companies for electric power and light furnished the mines. The operating and other expenses amounted to \$16,645.65, leaving net profits of \$52,728.68, out of which six monthly dividends of 10 cents per share, or \$5000 each, aggregating \$30,000, were paid. The cash surplus in the treasury amounts to \$22,728.68. Of the \$100,000 bonus paid by the Comstock mining companies, \$11,741.93 has been rebated, and the present credit balance of that bonus is \$88,258.07. The plant has been in steady and successful operation about nine months.

SHASTA COUNTY.

Supt. Ware says the mill site for the Mt. Shasta mine mill plant has been completed. The mill will be a crushing, concentrating and cyaniding plant of fifty tons capacity.

The Mountain Copper Co. is making alterations on the plant at Keswick, preparing to install converter stands. This addition will affect a considerable economy in freight, as bullion, instead of 50% matte, will be the product shipped. The company is opening up new ground on the opposite side of Iron mountain from the point of present operations.

The building for the converter plant addition at DeLamar is completed and the machinery is being installed. Another engine of 250 H. P. is to be added to the plant. The DeLamar Co. has bought a site on Squaw creek for a pumping station to supply water during two or three months in the year.

The Clipper mine, on Squaw creek, near Kennet, is being reopened. J. H. Walkotte is Supt. The mine will be retimbered and the old tunnel and drifts cleaned out before exploratory work will be resumed.

The South Fork M. Co., at Igo, is driving a 2700-foot tunnel and two shafts, using power drills.

P. Gibney has run a tunnel at Igo on a contract and has developed a good body of copper ore. The proposition is to put up a smelter.

The Trinity Copper Co., which owns the Shasta King, Copper King and other mines, and of which T. W. Lawson of Boston is president, has commenced construction at Kennett, 5 miles from the mines. Manager H. A. Keller states that the 1000-ton smelter is to be located on Backbone creek, 1 mile north of Kennett.

SISKIYOU COUNTY.

E. D. Baker of the Cherry Hill quartz mine, at Cherry creek, has organized a company in New York, capital \$1,000,000, to work the mine on a more extensive scale. It is proposed to run a 1000-foot tunnel.

The new 300-foot tunnel at the Las Parlas mine, on South Fork of Salmon, is completed and has opened up a vein from 14 to 20 feet wide. O. Herschey of Cecilville is Supt.

Howard Bros. have found a rich pocket of quartz above Happy Camp, from which they have taken out \$4000 in gold, with considerable more in sight.

TRINITY COUNTY.

M. McIlwaine of the Lawrence mine, near Carrville, has shipped \$13,000 in gold from a run of eighteen tons of ore, crushed in a little ball mill. The present owners are said to have paid \$5000 for the mine a few months since.

Lorenz Bros. have located 420 acres at the head of Coffee creek and south fork of Salmon river. From prospecting they estimate that the ground will yield \$6000 to the acre and the cost of getting the gold out \$3000 per acre. Water will be obtained from Grizzly creek and brought by flume. A portable sawmill and the sheet iron for pipe will be taken to the mine. The gold on the claim is very coarse, several nuggets worth \$40 each having been found.

TUOLUMNE COUNTY.

Operations are to be resumed on the Contention mine, on Knights creek. G. Howe of Columbia is manager.

The Willietta mine, at Jacksonville, is closed down.

E. Doyle and W. C. Oakes have sold

their interest in the Darrow mine, Jamestown, to the Hampton Bros., who have commenced work. The new owners have put a compressor and machine drills on the mine.

H. J. Sisty, for Colorado people, has made arrangements to reopen the old Soulsby mine at Soulsbyville.

C. L. Linder is manager for a new electric power company who is preparing to put in a power plant on the Tuolumne river near Jacksonville. The ditch will be 16 feet wide, 6 feet deep and 5½ miles long. It will give 120 feet head, from which 2000 H. P. are proposed to be developed. It is planned to begin work by Aug. 15 and complete by March 1 next.

Peterson & Ogden of Columbia have bought out the interest of F. Plummer in the Telephone mine, on Five-mile creek.

D. Kelley has bonded the Admiral Von Tromp mine, Columbia, to a New York company, who have already commenced operating it.

O. H. Perry and S. A. Gilchrist of the Clio mine, Jacksonville, have arranged to have petroleum fuel at the mine, and report that the mill will be started up soon as the fuel is on the ground.

At the Bluebird mine, on the East Lode, near the Buchanan, a prospect quartz mill has just been erected. Fifteen men are employed.

The Hampton Bros. have bought the bond on the Darrow mine at Sonora from W. C. Oakes and E. Doyle, the bond calling for \$16,000 and running for four and one-half years.

The Porto Fino mine, near Carters, owned by J. H. West, is being worked under bond by Eastern parties, who, it is understood, have decided to take the mine.

COLORADO.

BOULDER COUNTY.

The Red Lion mine at Bloomerville has resumed after being closed down for four years. The Red Lion group is one of the largest mines in the Ward district, and has produced large quantities of ore. The present owners are Duncan, Wise & Cheney; D. Hutchinson is Supt. The ore now taken out will be shipped for treatment, but it is expected a mill will be required on the ground for the treatment of the large bodies of low-grade ore.

The Apex M. & M. Co. at Eldora owns a group of seven claims and is repairing the machinery plant to resume operations at once. M. B. Tomblin is Supt.

CLEAR CREEK COUNTY.

J. E. Hunter, D. C. Folsom, T. S. Hunter, J. M. Shoate and W. R. Benzie have incorporated the Folsom-Kelso Mountain Mines Co. in Wyoming—capital \$15,000—to operate mines near Georgetown.

The Terrible mining property, at Georgetown, owned by the New Colorado S. M. Co., Ltd., and the Colorado Deep Level M. Co., Ltd., has been bought at sheriff's sale by R. G. Simonds. The property comprises thirty-five mining claims, millsites, tunnels, etc., and has a record of production of several million dollars.

The Lombard-Polais group at Alice, developed by two tunnels on veins, is reported to have been bought by an English syndicate for \$100,000. The new owners will place machinery on the mine and sink a shaft to connect with the Manhattan tunnel of the Yankee Con. M. & T. Co., which will cut the vein between 700 and 800 feet down. It is planned that when this tunnel is completed a large mill will be built by the Lombard-Polais people at the mouth of the tunnel.

W. P. McCormick has arranged to start up the Blackwood Co. property, near Idaho Springs. It is the intention of Mr. McCormick to put on machinery and sink the shaft.

DOLORES COUNTY.

The Grand Duke, Forest, Magpie, Dawn of Day, Orphan Girl, Wild Cat, Eureka and Cornucopia mining claims, near Rico, have been bought by G. B. O'Reilly for \$8000. It is understood that Mr. O'Reilly will raise a working capital to reopen the properties.

Arrangements are being made to reopen the San Isabel mine at Crestone under a new management. The property is equipped with a mill, air drills, tramway and all necessary machinery.

The Town Topics G. M. Co. of Denver has declared the second quarterly dividend of \$5000, payable on August 1st. S. A. Josephi of Denver is president of the company, which is operating the East Notaway mine, at Central City, under the management of M. D. Draper. They are now cleaning out the main shaft, which is filled with thirty years' accumulated debris.

LAKE COUNTY.

The company operating the Gold Copper smelter is arranging for improvement to its Leadville plant and for the erection of another plant at Robinson. The improvements to be made at Leadville are to con-

sist of a system of ore bins and mechanical arrangements for the automatic handling of ore to the furnaces. It is intended to build the smelter at Robinson this year. The company owns the Robinson and Washington mines at Robinson, which they will operate. W. B. Duvall of Leadville is manager of both plants.

OURAY COUNTY.

The Mountain Lion group, adjacent to the Camp Bird, has been bought by Boston people. D. N. Baker of Newtonville, Mass., is part owner. Mr. Walker, the resident manager, is to immediately put on a machinery equipment.

PITKIN COUNTY.

It is reported that leasers on the Mollie Gibson at Aspen have found rich ore in the sixth level. It is stated that a shipment of seventy sacks of ore going several thousand ounces to the ton has been made. The ore is said to have been found in a large and continuous body and very high grade as far as it has been exploited.

SAN JUAN COUNTY.

Work has been resumed on the Wyandotte group at Silverton by the Mammoth Tunnel Co. Four large leads are covered by a majority of the ten claims of this group. Two tunnels are being run to cut the Wyandotte vein at depths of 300 and 800 feet.

The Syndicate M. Co. has men at work on the Gold Bug group at Silverton. The Syndicate Co. are considering the feasibility of the building of a mill to be operated by water power from the outlet of a lake near by.

The owners of the Zuni group in Zuni gulch, Silverton, have resumed operations. The mine is being put in shape for production and further development. Col. J. Atwell of Pennsylvania and W. C. McKelvey of Cripple Creek now hold the control of the company.

SUMMIT COUNTY.

The Woodbury M. Co., L. S. Cornell of Denver president, has let contracts for extensive development work to be distributed among the sixteen claims composing the group controlled.

The project to establish works for roasting and leaching ores from the Marshall Russell M. Co., on Miller mountain, will add a novel method of treatment for Empire.

TELLER COUNTY.

The Hanna Britt mine has been reopened by lessees represented by J. McElwee of Cripple Creek. The lessees are Kansas City people, who agree to operate for eighteen months, the royalty on ore mined to be 25%.

Cox and partners, leasing the Canary Bird at Cripple Creek, have made a strike on the surface. The ore is not in place, but seems to be in quantity. It is composed of a sand quartz and talc and runs about \$180 to the ton in gold.

U. S. Hollister, L. P. Stauer and M. Smith of Denver have incorporated the Tunnel M. & L. Co. to operate the Finn lease on the Colorado Boss claim, which has been transferred to them by the Cripple Creek Con. Co., and also the Work Co. lease on the Morning Glory No. 4.

IDAHO.

ADA COUNTY.

The Lucky Ridge M. & D. Co., Ltd., has been incorporated, capital \$100,000, by J. R. Monroe, J. H. Longfellow, J. L. Brown, H. M. Elkington and J. T. Pence, who are the directors.

BLAINE COUNTY.

The Idahoan mine, at Hailey, has been bonded, the lessees being required to work on the property uninterruptedly. There is a shaft 900 feet deep on the mine. They intend to begin development about 1000 feet south of this shaft and will run a tunnel to it.

The Gladiator mine, near Galena, has been reopened. The work is in charge of K. Taylor, manager of the Philadelphia & Idaho M. & S. Co.

H. W. Schultz, who is working the Ophir and Trapper claims under a lease from P. P. Baxter of Ketchum and associates, has at least two carloads of high-grade shipping ore out, and has increased his force of miners for the summer.

CUSTER COUNTY.

R. Bell says a body of fine smelting ore has been opened up in the Democrat vein at Bayhorse by lessees. The shoot, he states, carries an average of 100 ounces silver, 55% lead, 5% copper and \$3 gold per ton. This mine is owned by W. Treloar, formerly of Salt Lake City, Utah.

IDAHO COUNTY.

W. H. Harris, superintendent of the Victor placer mine on Salmon river, near Grangeville, says the present company has owned the property for six years, and has during that time developed the mine. The plant has a capacity of about 8000 yards a day and the 210 feet of gravel

bank is said to give an average value of 7 cents a cubic yard.

A. M. Moore of the Wise Boy mine, in Buffalo Hump, states that he and his associate owners will put a stamp mill on the mine at once. The intention is to mill a large body of high-grade ore while development work continues.

MONTANA.

BEAVERHEAD COUNTY.

S. J. Dennis of Butte has bonded the Indian Queen mine and will do development work on it.

DAWSON COUNTY.

D. T. Haskett & Co. are working the tailings from the Hecla plant at Glendive with a concentrator and cyanide plant.

JEFFERSON COUNTY.

Miles & Delmos have an eighteen months' lease and bond on the National claim, 7 miles east of Butte. The property is a gold mine owned by the National G. & C. M. Co. of Butte. The vein is said to be from 10 to 25 feet wide, with ore carrying from \$10 to \$15 in gold per ton. The ore requires cyanide treatment. If the bond is not taken up, the company will build a cyanide plant for treating the ore.

LEWIS AND CLARKE COUNTY.

The Plegan mine, near Marysville, has been bought by the Plegan Con. M. Co., incorporated by O. M. Lanstrum and J. Larson of Marysville and N. B. Holter, J. A. Walsh and C. C. Newman of Helena. The capital is \$250,000.

W. Dunn and H. Huberger, who are sinking the 100-foot shaft on the Calumet, at Copperopolis, the property of Spencer, Mayn & Heitman, E. M. Edwards and A. M. Holter of Helena, has made a big strike.

The D. & C. M. Co., operating the American Eagle mine at Helena, has bought the 10-stamp mill at the Woods & Esler mine near Winston, and will install it at the American Eagle at once.

MADISON COUNTY.

(Special Correspondence).—The Watseca mine and mill is at Rochester, 12 miles southeast from Melrose, on the Oregon Short Line. The mine is opened through two shafts, several hundred feet apart—one a vertical shaft 200 feet deep and the other an incline about the same depth. On some levels of the mine the ores are oxidized, carrying gold that is partially free-milling. On other levels the ore consists of an iron, arsenical and antimonial sulphide, carrying good values in gold and some silver. The company is operating a mill which they have leased. It is equipped with cyanide apparatus, crushers, rolls, grinders, plates and concentrators. The oxidized ores are first cyanided, then passed through Huntington mills, thence over the amalgamating plates. The larger percentage of the gold is saved by cyanide, the object of running the leached material over the plates being to secure the larger particles of gold that fail to dissolve. It will be observed that this cyaniding first and amalgamating the tailings is the reverse of the usual method. The base ores, heavy in iron and sulphur, with some arsenic, antimony and lead, are crushed, rolled, screened and run over Wilfley and Standard concentrators, by which four or five tons are reduced to one ton, making a product that grades high, and which commands at the smelter an allowance for the iron it contains. The Watseca belongs to McCune and associates of Salt Lake City, Utah, the mill being in charge of H. S. Kenney and the mine in charge of Supt. Kingsbury.

Rochester, July 17.

SILVER BOW COUNTY.

(Special Correspondence).—A good deal of new work is being done in the range of hills on the east side of Silver Bow creek, at Butte, the idea being to demonstrate, if possible, that the great ore shoots of the main copper belt extend eastward to that locality. A little time, energy and money will settle the question as to whether the Butte copper district can be enlarged in area.

The Butte Reduction Co. mill receives the second grades from the Clark group, most of which comes from levels at 1000 to 1400 feet. This mill is equipped with crushers, rolls, Chilian grinders, elevators, screens, about forty Wilfley tables and the same number of jigs. Five grades of jig product are made. The jig tailings that fail to pass a 16-mesh screen go to the Chilian grinders. The fine jig tailings and the grinder product pass to the tables. These ores carry considerable amount of iron and from 60% to 70% silica. The slimes, resulting from the ores being ground to a fine pulp, are passed over tables. Much of this slime is sufficiently fine to pass a 200-mesh screen. The slime water from this group of ores carries very little copper in solution. In the crush department a powerful magnet has been set at the head of the crusher and trommels to pick up hammers, drills and

picks, which often come down in the ore, and which otherwise would break the machinery. The magnet will pick up a 6-pound hammer.

Butte, July 12.

E. H. Wilson of Butte has located a claim which he has called the "Blue." It is surrounded by properties said to be rich in mineral.

NEVADA.

LANDER COUNTY.

The New Pass G. M. Co. has incorporated, capital \$250,000, to operate the Superior and eight other mining claims in the Reese River mining district. W. G. Filer is president, G. C. Snyder, of Salt Lake City, Utah, secretary and treasurer.

LINCOLN COUNTY.

R. A. Parker, consulting engineer for the United States M. Co., has returned from Bunkerville, where he has been conducting an examination of property that was acquired by R. D. Evans of Boston and his associates, operating a copper mine at Bunkerville, employing twenty-five men, and says that while a fine body of copper-bearing ore has been encountered, carrying some nickel, the most interesting feature is the presence of platinum. As developments have progressed the amount of this metal has become more pronounced, though the values are not large.

WHITE PINE COUNTY.

Work is to be resumed in the tunnel in the Eberhardt mine, near Ely.

WASHOE COUNTY.

S. Francovich, L. D. Piazza and D. Dondero have taken \$15,000 from a 250-ton run from their mine at Olinghouse.

W. C. Williams has taken \$3700 gold from sixty-three tons of ore from his mine at Olinghouse.

NEW MEXICO.

GRANT COUNTY.

The Pinos Altos M. Co. is retimbering the old Bell & Stephenson workings at Pinos Altos. The mill improvements have been completed and the capacity increased to 200 tons daily.

R. L. Powell and F. J. Buck of Silver City have leased the old Bell & Stephenson dumps from the Pinos Altos G. M. Co. and are preparing to work them by the cyanide process.

The Gem Turquoise & Copper Co. has bought the turquoise and copper claims at Burros, commonly known as the Parker mines. J. M. Wiley is Supt. The company will cut and market their own turquoise, and H. E. Oppenheimer has been appointed as European agent and A. Lorsch & Co. of New York City as agents for the United States and Canada. The president of the company is A. K. Sloan; F. T. Sloan is secretary of the company. A fifty-ton concentrating mill will be erected for the treatment of the copper ores.

SANTA FE COUNTY.

A rich strike is reported to have been made in the Black Hawk mine, near Golden.

SOCORRO COUNTY.

The Maud S. mill at Mogollon has been started up and is intended to be kept running to its capacity of fifty tons daily.

The Last Chance mill at Mogollon is being operated.

OREGON.

BAKER COUNTY.

The Kenyon & Brown placer claim, about 15 miles southwest of Baker City, consists of 290 acres, which they are preparing to work on a large scale. The gold produced averages \$16 per ounce, and is quite coarse. The bedrock is slate, above which is 6 feet of gravel very rich in gold.

W. Smith has struck a rich placer on Snake river, opposite Flick Bar, taking out \$400 in June with his rocker. The gold is coarse, some pieces weighing \$2. Much of the dirt pays \$5 to the wheelbarrow load.

JOSEPHINE COUNTY.

The Horseshoe ledge on Foote's creek is owned by Ward, Wiggins & Silsby of Grant's Pass. The vein carries gold values running \$50 to the ton free milling. A new stamp mill is being put on the mine.

The mine of Fitzgibbon & Son on Foote's creek has been bought by Y. T. Blake of San Francisco, who is arranging for its further development.

The Copper Stain mine in Mt. Reuben district is owned by J. H. Wetherell & Co. of Grant's Pass. The ore has an assay value of \$20 to \$35 per ton, mostly in sulphurets. The rock, besides gold, carries copper and silver.

The Fortune M. Co. has been incorporated, with headquarters at Grant's Pass. The capital is \$50,000. O. S. Goodnow, J. Ward and J. L. Wiggins are the incorporators.

MARION COUNTY.

B. P. Taylor of Pomona, Cal., and sev-

eral Colorado men, have bought the Savage-Mohney mine at Quartzville and are now making arrangements for its development. Mr. Taylor will be Supt.

SOUTH DAKOTA.

PENNINGTON COUNTY.

It is reported that the Father DeSmet stamp mill of the Homestake Co. will be started up. The clean-ups now amount to nearly half a million dollars a month, and with new mill in operation it will add \$50,000 to this. The clean-up at the new cyanide plant is reported to be far above expectations.

It is said that W. O. Morrison and associates of Colorado Springs, Colo., have bought a half interest in the mines of E. Hanschka, in the Ragged Top district, for \$50,000. A large cyanide plant is to be erected.

UTAH.

Arrangements for the enlargement of the mill of the Annie Laurie of Gold mountain have been completed, to cost about \$10,000, and will provide for two additional leaching tanks. This will not, says Manager W. G. Filer, make any great increase in the treatment of ore, but will enable them to keep the ore in the tanks longer and secure thorough leaching.

BOX ELDER COUNTY.

The Mayflower G. M. Co. has been incorporated, capital \$75,000. G. W. E. Dorsey is president and W. W. Brown of Salt Lake City secretary. The company own the Daisy group of seven locations in Park valley. W. E. Dorsey is manager and has started development work on the ground.

GRAND COUNTY.

The Wolf Bros. have opened a good vein on the Skylark at Basin City, carrying both gold and copper.

The Pilot Mountain Co. has been at work on its tunnel and has opened a vein 14 feet wide, which spans gold all the way across.

JUAB COUNTY.

R. J. Evans has bonded the Selma group of four claims, near Homansville, of L. C. Peterson and F. Zamboni at \$30,000. It is understood that Mr. Evans will organize a company to undertake some extensive development work.

TOOELE COUNTY.

The Montana Con. M. Co. has incorporated, capital \$100,000, R. Mulhall president, J. B. Weimer of Salt Lake City secretary and treasurer. The company owns the Challenger and nine other mining claims in the Ophir mining district.

The mine operators of Stockton are organizing to provide cheaper transportation between the mines and railway. I. A. Benton, president of the Cygnet mine, says the proposition is to build a tramway of sufficient capacity to haul the ores from the mines embraced in the undertaking, a spur running to each. The tramway will not be an expensive undertaking, nor require much time to construct. In the reduced cost of transportation the tramway is expected to soon pay for itself.

WASHINGTON.

FERRY COUNTY.

A strike has been reported on the Orient, on the Kettle river, about 12 miles from Marcus. It is owned by a Noblesville, Ind., company. Two shafts have been sunk and a tunnel run in some 500 feet. The company has in operation two drills and an air compressor. W. Townsend is Supt.

SPOKANE COUNTY.

The Diamond G. & C. M. Co. has been incorporated, with its head office at Spokane, by J. E. West, H. R. Miller, T. F. Bailey, G. A. Graham, W. H. Spaulding of St. Regis, Mont., B. R. Lindly and J. R. Cassin.

STEVENS COUNTY.

The Northport S. & R. Co. has been incorporated by W. B. Heyburn, E. M. Heyburn, W. B. Sams, D. C. Corbin and J. W. Morrison at Wallace, Idaho, with \$1,000,000 capital, all subscribed by the directors—W. B. Heyburn, B. F. O'Neill, L. Odell, B. MacDonald and T. M. Daly. Mr. MacDonald, as trustee, subscribed for 999,996 shares and the other directors for one share each. The object of the corporation is to acquire the Northport smelter, the legal status of which had been affected by the decision of the Washington Supreme Court ruling against one corporation owning the stock of another.

FOREIGN.

BRITISH COLUMBIA.

A strike of a 40-foot vein is reported on the Niagara group, owned by D. Mowat and others of Nelson. The ore is low-grade, but free-milling. Surface assays yield \$7.50 a ton.

The diamond drill in the Idaho, owned

by the Dominion Copper Co., at Phoenix, has struck almost pure copper ore at 80 feet down.

The St. Eugene mine, at Moyle, in East Kootenay, has quit breaking ore and is only doing development work. The company had a contract with a Belgian company to ship 9000 tons of ore within six months, to be paid for on the London quotation, which was about \$16 per ton for lead when the contract was made. Since then the price has dropped to about \$12 per ton, and is so low that the company has decided that it would be robbing the mine to keep on shipping beyond the contract.

The Horsely Hydraulic Co., since the hydraulic plant at Horsely was closed down after working 900 feet into the bank, which there became so hard that it would not yield its gold either to hydraulic or powder, has been developed as a drifting proposition. The property takes in an ancient river channel bed that has been explored from one rim a distance across the channel of 1800 feet without striking the opposite rim. The bedrock, so far as known, lies about 90 feet above the bed of the Horsely river. The development work has been the opening up and blocking out of the ground for the extraction of gravel on a large scale. The blocks of pay gravel opened up are thoroughly tested, and several hundred tons have been extracted and crushed in the company's 10-stamp prospecting mill. It is estimated that over 100,000 tons of gravel are now opened up ready for extraction. The gold extracted during the progress of development work has paid a large percentage of the cost of this work. The bottom stratum of gravel from 2 feet to 6 feet yields from \$1.25 to \$6 gold a ton. Platinum to the amount of 1% of the weight of gold is recovered, and it is intended, when the mine is worked, that special appliances will be installed to save it. J. B. Hobson is manager and J. W. Boswell foreman.

A strike is reported from the Ymir mine of an ore body of considerable size and richness. Twenty-six feet of \$40 ore is now said to be exposed on the No. 4 level. Up to the present time large profits have been made from ore in this mine averaging less than \$9 per ton.

MEXICO.

G. Mitchell, Supt. of the Greene Con. mines at La Cananea, says that 1860 men are employed at the mines. The third furnace is nearing completion. It will be blown in about September, increasing the smelting capacity to 700 tons of ore a day. The company has completed 4 miles of its narrow gauge railroad and 9 miles of standard gauge is well under way.

Books Received.

"Field Book of Practical Mineralogy," 12 mo., pp. 186, by G. W. Miller, E. M., C. E., is a handy volume of pocket size, designed to assist the prospector and small mine owner in exploring and exploiting mines, and in making reports on them. Published by Publishers' Press Room Co., 1441 Curtis street, Denver, Colo.

"The Mineral Industry," Vol. IX, 8vo., pp. 936, by Richard P. Rothwell, late editor of the Engineering and Mining Journal, is fully up to the high standard established by its predecessors, not alone in the completeness and accuracy of its statistical data, but in its resume of advances in the arts of mining and metallurgy during the year it records. These volumes have a permanent value for reference that entitles them to a place in the working library of the mine owner and metallurgist. Published by the Scientific Publishing Co., New York and London. \$5 postpaid.

Catalogues Received.

C. O. BARTLETT & Co. have issued Catalogue No. 3, Paint Machinery, an attractive booklet handsomely illustrated, giving descriptions, information and prices of their special types of machines employed in the manufacture of paint and some types employed in grinding and mixing minerals for other industrial use. C. O. Bartlett & Co. will be pleased to mail the catalogue on application for it to their office at Cleveland, Ohio.

JOHN A. ROEBLING'S SONS Co. of Trenton, N. J., have issued a trade catalogue entitled "The Splicing of Wire Ropes." The story of the catalogue, the description of the methods of splicing employed by the company in its factory, for the assistance of the users of wire ropes, is well told in the text and illuminated with many full-page half-tones. It is an excellent book for the mine foreman's library. The John A. Roebling's Sons Co. will be pleased to send it on request made to their main office in Trenton, or to any of their branch offices in New York, Chicago, Cleveland or San Francisco.

Personal.

C. L. LINDER of New York is at Jacksonville, Cal.

W. L. WATTS is examining oil land in Humboldt county, Cal.

W. C. RALSTON has returned from Boston to San Francisco.

MAJ. A. V. BOHN, of Leadville, Colo., was in Salt Lake City on the 19th inst.

W. J. LORING has been appointed Supt. of the Melones mine at Angels Camp, Cal.

M. L. EFFINGER, Supt. of the Tiawau-kee mine at Bingham, Utah, is in Detroit, Mich.

A. J. SCHUMACHER of Butte, Mont., is at Mineral, Idaho, examining copper mines.

L. O. COWAN, superintendent of La Calara mines, Sonora, Mexico, is in Denver, Colo.

H. S. CHANCE, E. M., of Philadelphia, Pa., is at Globe, Ariz., examining copper properties.

CHARLES WOLF has resigned as superintendent of the Gold Hill mine at Angels Camp, Cal.

GEO. H. EVANS of Denver, Colo., is in Sierra county, Cal., examining gold dredging ground.

J. H. MCCHRYSTAL of Eureka, Utah, is examining a mining proposition at Hailey, Idaho.

P. WISEMAN, general manager of the Shannon Copper Co. at Clifton, Ariz., is in Butte, Mont.

R. H. TOLL of Denver, Colo., is now Supt. Sundown and Timberline groups, near Mancos, Colo.

JAMES BURKE, who has been in the East for several weeks, has returned to Salt Lake City, Utah.

O. ABELING of Moscow, Idaho, has gone to Santiago de Cuba to put up a large concentrating mill.

JEAN F. WEBB, of the Pneumatic Cyanide Process, Denver, Colo., recently spent several weeks in Utah.

PATRICK CLARK of Spokane, Wash., is visiting Hollis and Copper Mountain, Prince of Wales Island, Alaska.

MARK B. KERE, Supt. W. Y. O. D. mine at Grass Valley, Cal., has returned from San Francisco to the mine.

O. OBLING, M. E., of Grangeville, Idaho, is at Santiago, Cuba, superintending the erection of a mining plant.

S. W. CHENEY, formerly of the Mammoth mine, Whitehouse, Shasta county, Cal., is now operating in Plumas county, Cal.

J. H. SHOCKLEY, formerly Supt. of the Mt. Diablo mine, Candelaria, Nev., is in charge of the Andrus mine at Telluride, Colo.

GEORGE MITCHELL, superintendent of the Greene Con. mines of La Cananea, Sonora, Mexico, is sojourning at Phoenix, Ariz.

H. J. WALSH, who has spent a year in Sumatra, examining placer mines for a Dutch company, has returned to San Francisco.

EDW. H. BENJAMIN, secretary California State Miners' Association, has returned to San Francisco from Hermosillo, Sonora, Mexico.

C. H. CUTTING, manager of the Troy Copper Co. of Troy, Ariz., has been appointed manager of the Manhattan mine at the same place.

L. CUMMINS, cyanide chemist Headlight mine, Carrville, Trinity county, Cal., has accepted position as chemist for Luckhardt & Co., San Francisco.

ALFRED H. BROOKS and C. C. BRAYTON of the U. S. Geological Survey are examining the mining deposits in Ketchikan district, southeastern Alaska.

The International Mining Congress at Boise, Idaho, elected E. L. Schaffner of Ohio president, Major Fred R. Reed of Boise, Idaho, vice-president, and re-elected Irwin Mahon secretary.

Commercial Paragraphs.

A NEW PROCESS noiseless pinion and cut cast-iron mate have recently been shipped to Glasgow, Scotland, by the New Process Raw Hide Co., Syracuse, N. Y., to be used in connecting an electric motor to a printing press in use at the Glasgow Exhibition.

THE Sierra Railway Co. of California write from San Francisco, Cal., to the Jackson Hand Power Drill Co., Denver, Colo.: "We have been giving your Jackson hand power drill a test and are very much pleased with it. We find that two men with it can do the work of six men by hand."

THE New Process Raw Hide Co., Syracuse, N. Y., is in receipt of an order from an Eastern machine company for ten pairs

of gear wheels, the larger to be cut cast iron and the smaller new process raw hide, making a noiseless combination. The cut cast iron gears run from 20" to 80" and the raw hide pinions from 6 1/2" to 16" in diameter. The total amount of the order is above \$2000.

THE Guggenheim Exploration Co. have let the contract to the Denver office of the Allis-Chalmers Co. for the machinery for their 450-ton concentrating mill, to be erected at their Tecolotes mine, Santa Barbara, State of Chihuahua, Mexico. The Pride of the West Mining & Milling Co. at Patagonia, Ariz., have placed an order with the Allis-Chalmers Co., through their Denver office, for a Holt-hoff-Wetthey roasting furnace, 121x12 feet, with cooling floor, also one tandem compound Reynolds Corliss engine.

Obituary.

WITH regret is chronicled the sad and sudden death of Robert W. Grayson, of the firm of Ralston & Grayson of San Francisco, which occurred on the 20th inst., Mr. Grayson having been found dead in his bed by his father, who, alarmed at his son's non-appearance, went to his room. His death was due to heart disease, and his untimely taking off saddened a circle of friends who held the deceased gentleman in deservedly high esteem. Mr. Grayson was 35 years old, a native of California, and prominent in mining affairs.

Recently Declared Mining Dividends.

Yreka M. & M. Co., Cal., semi-annual, \$8 per share.....July 10
Town Topics G. M. Co., Colo., quarterly, 1/2 cent per share, \$5000.....Aug. 1
Quincy M. Co., Mich., semi-annual, \$6 per share, \$600,000....Aug. 15
Montana Ore Purchasing Co., quarterly, \$1 per share.....Aug. 9
Boston & Montana M. Co., quarterly, \$10 per share.....Aug. 20

New Patents.

DEWEY, STRONG & Co.'s SCIENTIFIC PRESS PATENT AGENCY, 330 Market St., S. F., has official reports of the following U. S. patents issued to Pacific coast inventors:

FOR THE WEEK ENDING JULY 16, 1901.

678,548.—SPEED REGULATOR—E. N. Corson, Los Angeles, Cal.
678,551.—BROCKETING MACHINE—J. T. Davis, S. F.
678,648.—SAW SET—C. L. Driefer, S. F.
678,562.—DRAWING BOARD—O. Haskell, San Rafael, Cal.
678,618.—FLOW—W. K. Hobson, Santa Maria, Cal.
678,621.—FURNACE—Hynes & Bert, Los Angeles, Cal.
678,639.—CULTIVATOR—T. J. Hubbell, Watsonville, Cal.
678,494.—CAN HEADING MACHINE—W. T. Jones, S. F.
678,793.—CONCENTRATOR—L. Look, Los Angeles, Cal.
678,679.—TREE PROP BRACKET—R. S. McIntyre, Riverside, Cal.
678,798.—TURNING TOOL—F. L. Stearns, Los Angeles, Cal.
678,523.—GOLD SAVING APPARATUS—C. P. Stewart, Oakland, Cal.
678,819.—ORE SEPARATOR—C. V. Watkins, Vinegar's Landing, Wash.
678,803.—SEWING MACHINE—S. B. Wickersham, Phoenix, Ariz.

Notices of Recent Patents.

Among the patents recently obtained through Dewey, Strong & Co.'s SCIENTIFIC PRESS U. S. and Foreign Patent Agency, the following are worthy of special mention:

NECKTIE HOLDERS—No. 677,951. July 9, 1901. P. M. Cady, San Francisco, Cal., one-half assigned to C. J. Kaighin, same place. This invention relates to an improved collar-button clasp to be secured to a necktie and by which the latter is held in position upon the wearer. It consists essentially of two connected members, each consisting of a plate having a portion bent outwardly and backwardly, and then outwardly and forwardly again, the ends of which are provided with notches adapted to grasp the shank of the collar button and to inclose the head within the jaws so formed by said bent portions.

CAN HEADING MACHINE—No. 678,494. July 16, 1901. W. T. Jones, San Francisco, Cal. One-half assigned to Henry Doyle. The object of this invention is to provide an apparatus for automatically placing the heads of cans in position upon the bodies. It consists of a horizontal endless conveyor upon which the cans are carried throughout the operation, a stop lever which regulates the admission of cans thereon, a revolving spacing and timing guide, a can-head feeder in which the can heads enter, and means by which the flanges of the heads are prevented from overlapping, a revolving carrier by which the heads are taken singly from the feeder and delivered into dies upon a revolving support, and the heads then placed upon the cans and crimped thereon.

CULTIVATOR—No. 678,489. July 16, 1901. T. J. Hubbell, Watsonville, Cal. Assigned to Drusilla Hubbell and Wm. H. Ames of same place. This invention relates to a land cultivator, and consists in a means by which the adjustable tooth-carrying frame may be expanded transversely to cut as wide a space as possible, or contracted to adjust it for travel between rows of trees, plants or vines which may have different spaces between them.

Latest Market Reports.

SAN FRANCISCO, July 25, 1901.

SILVER.—Per oz., Troy: London, 27d (standard ounce, 925 fine); New York, bar silver, 53c (1000 fine); San Francisco, 58c; Mexican dollars, 47c; San Francisco, 46c; New York.

COPPER.—New York: Lake, 1 to 3 casks, \$17.25; carload lots, \$17.00; Electrolytic, 1 to 3 casks, \$16.75; carload lots, \$16.62 1/2; Casting, 1 to 3 casks, \$16.60; carload lots, 16.50. San Francisco: 18. Mill copper plates, 20c; bars, 22@23c. London: \$67 13s 9d per ton.

LEAD.—New York, \$4.37 1/2; Salt Lake City, \$4.00; St. Louis, \$4.40; San Francisco \$4.90, carload lots; 5c 1000 to 4000 lbs.; pipe 6, sheet 6 1/2, bar 5 1/2; pig, \$5.25. London, \$12 2s 6d per ton=2.62 cents per lb.

SPELTER.—New York, \$4.20; St. Louis, \$3.75; London, \$16 2s 6d per ton=3.58c cts. per lb.; San Francisco, ton lots, 5 1/2c; 100-lb lots, 6c.

ANTIMONY.—New York, Cookson's, 10c; Hallett's, 9c; San Francisco, 1000-lb. lots, 10c; 300 to 500 lbs., 11c; 100-lb. lots, 13@15c.

IRON.—Pittsburg, Bessemer pig, \$16.00; gray forge, \$14.00; San Francisco, bar, per lb., 2.65c in small quantities.

STEEL.—Bessemer billets, Pittsburg, \$25; open hearth billets, \$27.00; San Francisco, bar, 7c to 12c per lb.

TIN.—New York, pig, \$26.62 1/2; San Francisco, ton lots, 30c; 1000 lbs., 30c; 500 lbs., 30c; less, 31c; bar tin, \$3 1/2, 35c.

QUICKSILVER.—New York, \$51.00 large lots; London, \$9 2s 6d; San Francisco, local, \$48.00 \$3 flask of 7 1/2 lbs.; Export, \$45.00.

MAGNESIUM.—New York, \$2.90 \$3 lb.; San Francisco, \$3.75.

ZINC.—San Francisco, 5 1/2c; slab, 5 1/2c; bar, 7c; zinc dust, N. Y., 8c.

BABBITT METAL.—San Francisco, No. 1, 10c.

SOLDER.—Half-and-half, 100-lb. lots, 19c; San Francisco, Plumbers', 100-lb. lots, 15 1/2c.

PHOSPHORUS.—F. o. b. New York 50@60c \$3 lb.

ASSAY LITHARGE.—San Francisco, 10c \$3 lb. small lots.

BISMUTH.—New York, \$3 lb., \$2.25 50-lb lots; San Francisco, \$2.50 to \$2.75 \$3 lb. lots.

PLATINUM.—San Francisco, crude, \$19 \$3 oz.; New York, \$20.50 per Troy oz.

FERRO-MANGANESE.—Pittsburg, 80%, domestic, \$58.50, large lots.

TUNGSTEN.—New York, \$3 lb., 95c; San Francisco, \$1.15.

FERRO-TUNGSTEN.—New York, 37%, 32c; San Francisco, 65c (60%).

NICKEL.—New York, 50@60c \$3 lb.

ALUMINUM.—New York, No. 1, 99% pure ingots, 35c; No. 2, 90%, 30c to 35c.

POWDER.—F. o. b. San Francisco: No. 1, 70% nitro-glycerine, per lb., in carload lots, 15c; less than one ton, 17c. No. 1*, 60%, carload lots, 13c; less than one ton, 15c. No. 1** 50%, carload lots, 11c; less than one ton, 13c. No. 2, 40%, carload lots, 10c; less than one ton, 12c. No. 2* 35%, carload lots, 9c; less than one ton, 11c. No. 2** 30% carload lots, 8c; less than one ton, 11c. Black blasting powder in carload lots, minimum car 725 kegs, \$1.50 per keg; less car lots, \$2 per keg.

CAPS.—3x, \$5.50 per 1000; 4x, \$6.50; 5x, \$8; Lion, \$9, in lots not less than 1000.

FUSE.—Triple tape, \$3.60 per 1000 feet; double tape, \$3.00; single tape, \$2.65; Hemp, \$2.10; Cement No. 2, \$3.00; Cement No. 1, \$2.65, in lots of 3000 feet and up.

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OILS.—Linsed, pure, boiled, bbl., 75c; cs., 80c; raw, bbl., 73c; cs., 78c. Deodorized Stove Gasoline, bulk, 14c; do., cs., 20c; 86° Gasoline, bulk, 20c; do., cs., 26c; 63° Naphtha or Benzine, deodorized, in bulk, per gal., 13c; do., in cs., 19c; Lard Oil, Extra Winter Strained, bbl., 75c; cs., 80c; No. 1 bbl., 50c; cs., 55c. Neatsfoot Oil, coopers' bbls., 60c; cs., 65c; No. 1 bbl., 50@52c; cs., 55@57c.

CHEMICALS.—Cyanide of potassium, 98%-99%, jobbing, 32 1/2@33 1/2c \$3 lb.; carloads, 30@31c; in 10-lb. tins, 40c; sulphuric acid, in carboys, 66c \$3 lb.; soda ash, \$1.90 100 lbs.; hyposulphite of soda, 23@23c \$3 lb.; blue vitriol, 5 1/2@6 1/2c \$3 lb.; borax, concentrated, 7@8c \$3 lb.; chloride of potash, 12@13c; roll sulphur, 6c; alum, \$1.90@2.00; flour sulphur, French, 24@24c; California refined, 1 1/2@2c; nitric acid, in carboys, 8c \$3 lb.; caustic soda, in drums, 3@4c \$3 lb.; Cal. s. soda, bbls., \$1.00; sks, 95c \$3 100 lbs.; chloride of lime, spot, \$2.50@2.60; nitrate of potash, in kegs, 8c; caustic potash, 10c in 40-lb. tins.

COAL.—San Francisco, coast, yard prices: Wellington, \$9; Seattle, \$7.00; Coos Bay, \$5.50; Southfield, \$9.00. Cargo lots, Eastern and foreign: Wallsend, \$8.00; Brymbo, \$7.50; Pennsylvania, hd., \$14.00; Scotch, \$8; Cumberland, \$12; Cannel, \$9.50; Welsh Anthracite, \$12.00; Rock Springs, \$8.50; Colorado Anthracite, \$14.50. Coke, \$16 per ton in bulk; \$18 in sacks.

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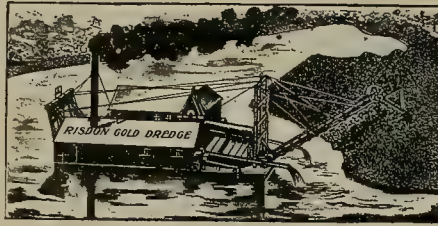
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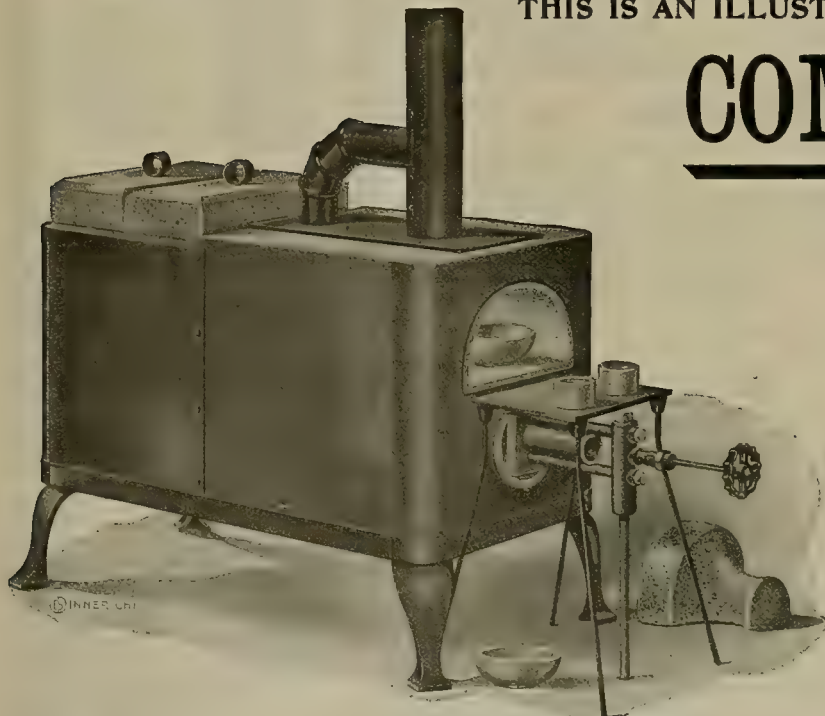
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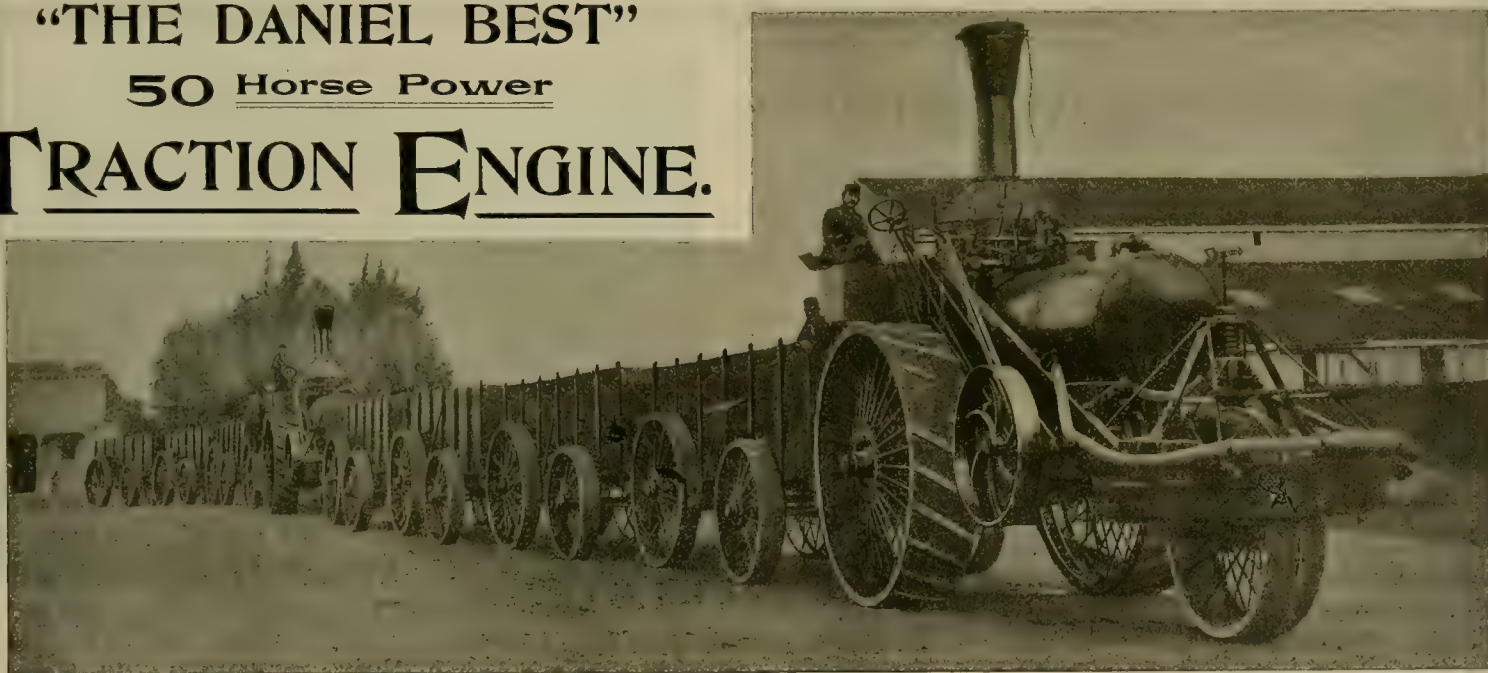
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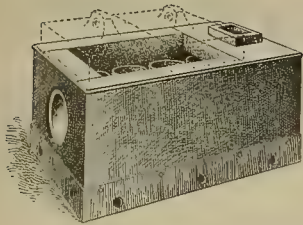
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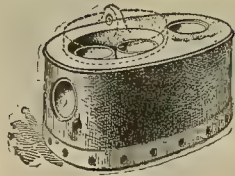
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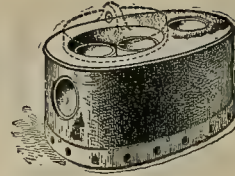
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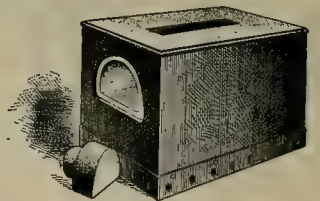
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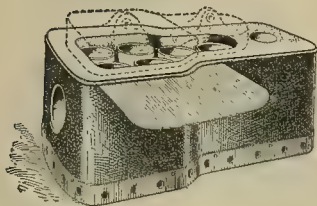
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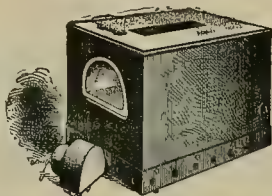
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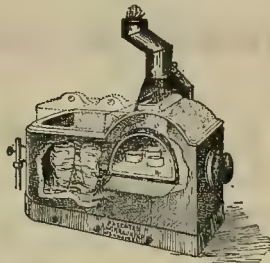
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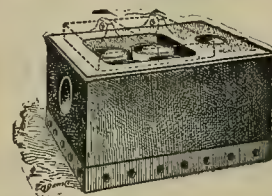
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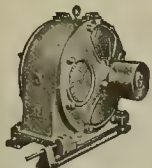
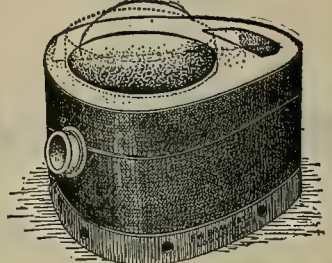
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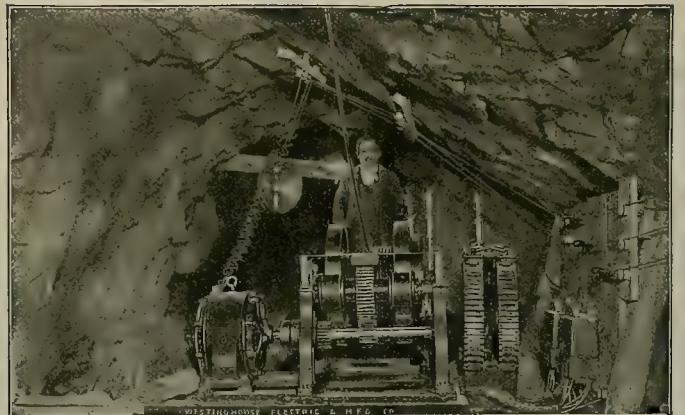
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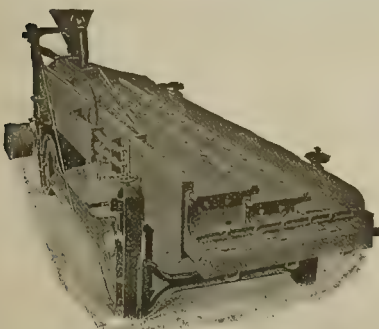
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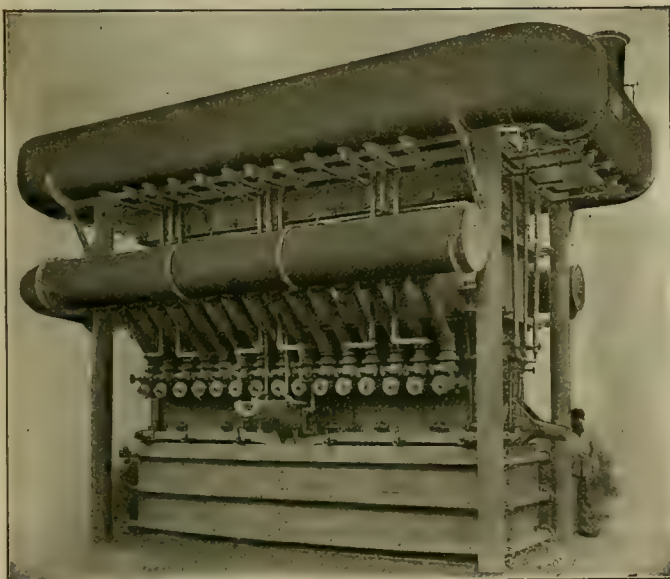
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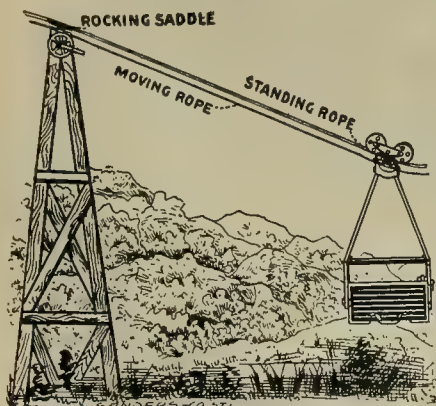
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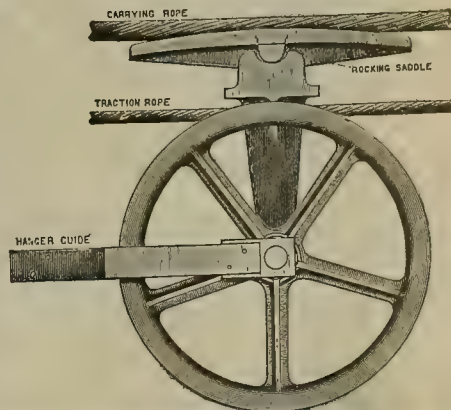
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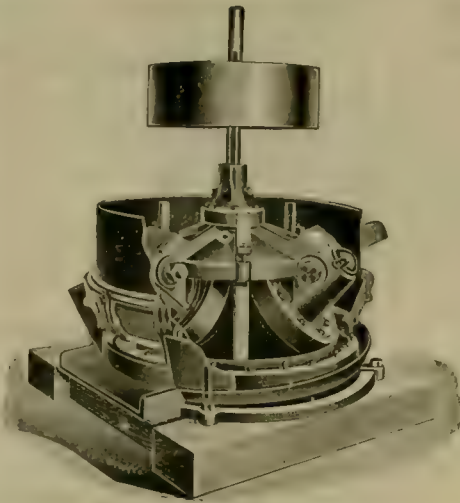
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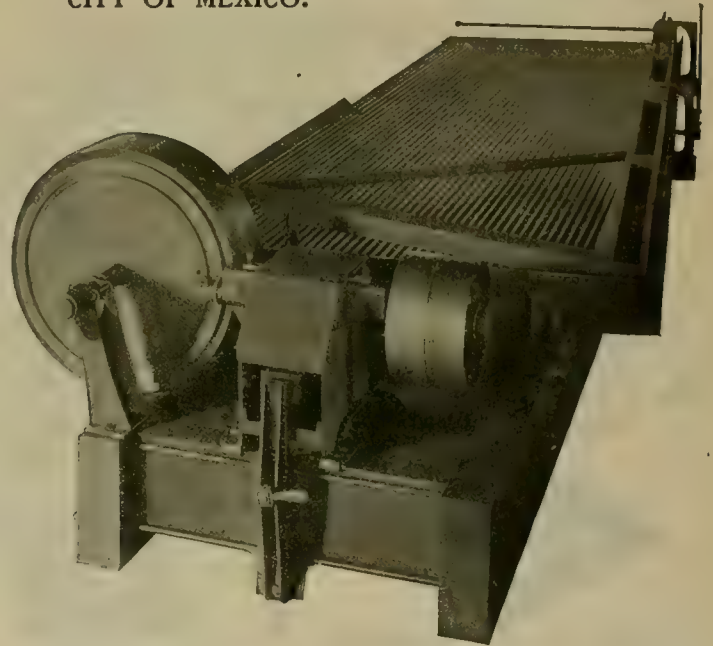
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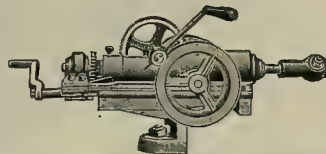
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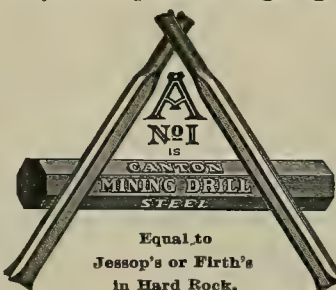


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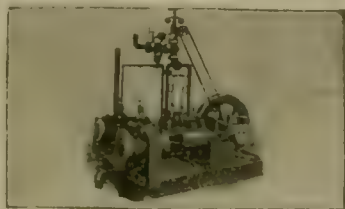
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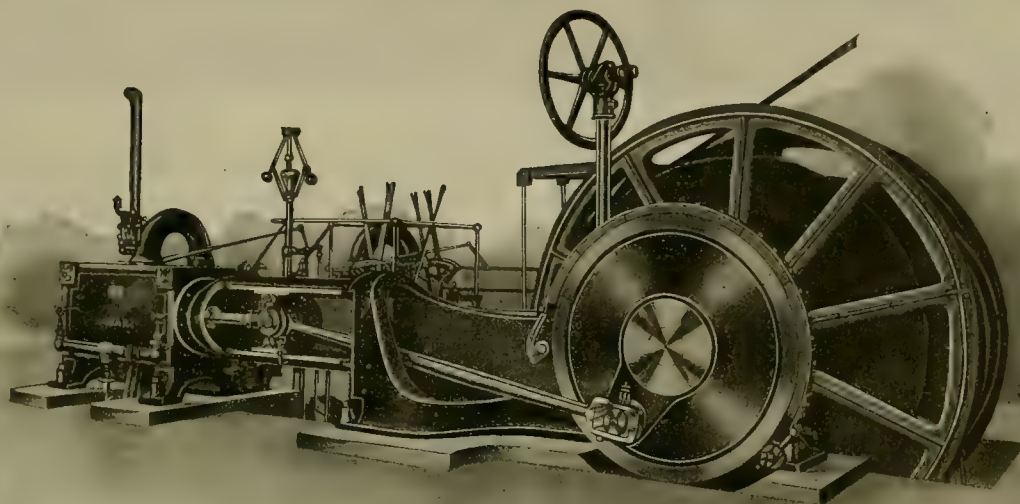
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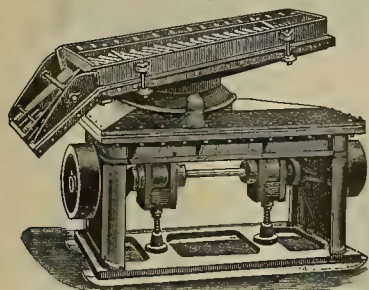


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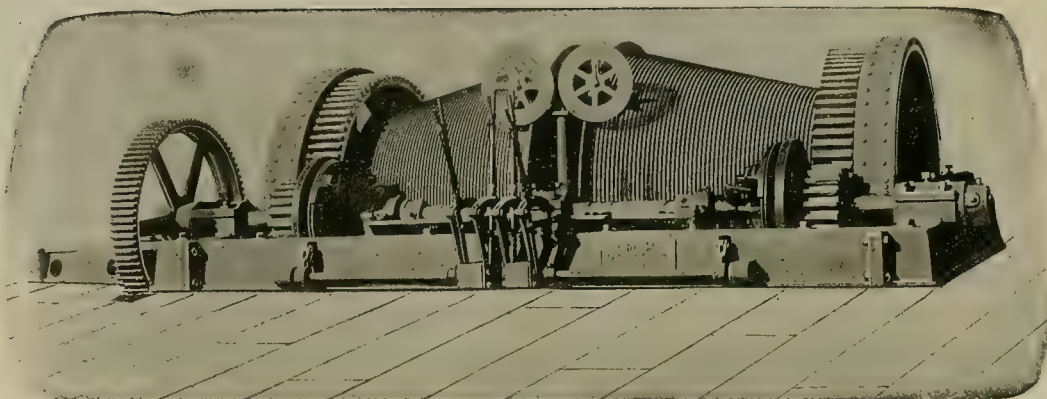
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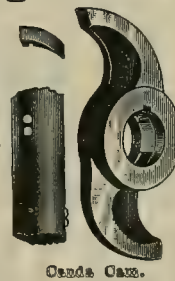
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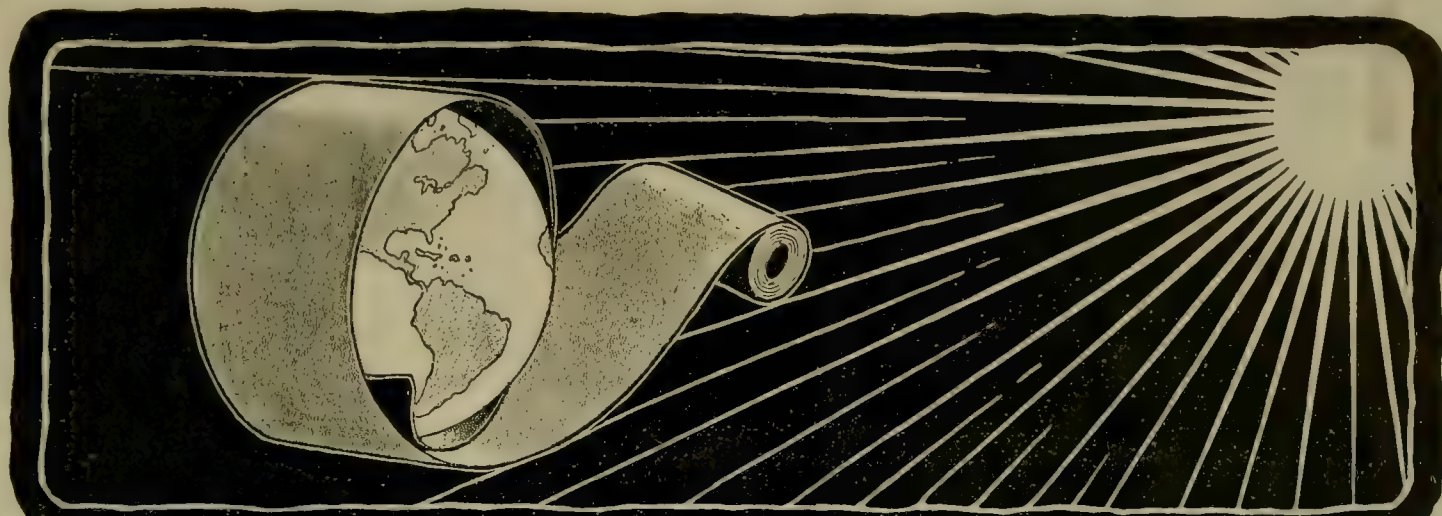
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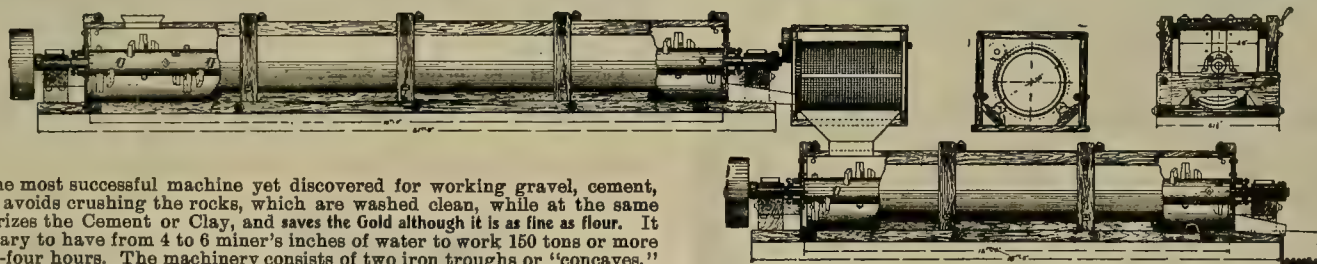
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Notice is hereby given, that at a meeting of the Board of Directors, held on the 23d day of June, 1901, an assessment (No. 2) of three cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin to the secretary, at the office of the company, Room 801, Claus Spreckels Building, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 30th day of July, 1901, will be delinquent and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 19th day of August, 1901, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.  
EDWARD H. STEARNS, Secretary.  
Office—Room 801, Claus Spreckels Building, San Francisco, California.

**CONSOLIDATED ST. GOTHARD GOLD MINING COMPANY.**—Location of principal place of business, San Francisco, California; location of works, Nevada County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 9th day of July, 1901, an assessment (No. 19) of ten cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin to the secretary, at the office of the company, 113 Crocker Building, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 12th day of August, 1901, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 24th day of September, 1901, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.  
B. N. SHOCRAFT, Secretary.  
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**BUREA CONSOLIDATED DRIFT MINING COMPANY.**—Location of principal place of business, San Francisco, California; location of works, Placer County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 9th day of July, 1901, an assessment (No. 31) of one-half cent per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin to the secretary, at the office of the company, 214 Pine street, room 31, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 15th day of August, 1901, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 24th day of September, 1901, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.  
GEO. W. DIXON, Secretary.  
Office—214 Pine street, room 31, San Francisco, California.

**THE BUTTE BASIN GRAVEL MINING COMPANY.**—Location of principal place of business, San Francisco, California; location of works, Amador County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 23d day of July, 1901, an assessment (No. 3) of One Cent per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin to the secretary, at his office, 35 Stuart street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 30th day of August, 1901, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 23d day of September, 1901, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.  
O. E. HOLMES, Secretary.  
Office—No. 35 Stuart street, San Francisco, California.

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## DELINQUENT SALE NOTICE.

**AMERICAN OIL AND REFINERY COMPANY.**—Location of principal place of business, San Francisco, California; location of works, Contra Costa County, California.

Notice.—There are delinquent upon the following described stock, on account of assessment (No. 2) levied on the 26th day of March, 1901, the several amounts set opposite the names of the respective shareholders, as follows:

| Names.                  | No. Shares. | Am't.         |
|-------------------------|-------------|---------------|
| Allen, S. L.            | 110         | 12 50         |
| Anderson, Mrs. Lulu     | 270         | 2 10          |
| Anthony, J. C. Trustee  | 797         | 1,000 00      |
| Anthony, J. C. Trustee  | 798         | 1,000 00      |
| Anthony, J. C. Trustee  | 799         | 1,000 00      |
| Anthony, J. C. Trustee  | 800         | 600 25        |
| Anthony, J. C. Trustee  | 801         | 600 25        |
| Anthony, J. C. Trustee  | 802         | 600 25        |
| Anthony, J. C. Trustee  | 803         | 600 25        |
| Anthony, J. C. Trustee  | 804         | 600 25        |
| Anthony, J. C. Trustee  | 805         | 600 25        |
| Anthony, J. C. Trustee  | 806         | 600 25        |
| Anthony, J. C. Trustee  | 807         | 600 25        |
| Anthony, J. C. Trustee  | 808         | 600 25        |
| Anthony, J. C. Trustee  | 809         | 600 25        |
| Anthony, J. C. Trustee  | 810         | 600 25        |
| Anthony, J. C. Trustee  | 811         | 600 25        |
| Anthony, J. C. Trustee  | 812         | 600 25        |
| Anthony, J. C. Trustee  | 813         | 600 25        |
| Anthony, J. C. Trustee  | 814         | 600 25        |
| Benecke, Diederich      | 83          | 1 75          |
| Brown, Mrs. Ida M.      | 152         | 7 35          |
| Buckley, Morris         | 788         | 2 50          |
| Carr, H. W.             | 719         | 2 25          |
| Conn, Mrs. Sarah A.     | 599         | 2 10          |
| Conn, Mrs. S. A.        | 693         | 2 12 50       |
| Corbiere, C. C.         | 561         | 5 25          |
| Corbiere, C. C.         | 565         | 5 25          |
| Crow, L. T.             | 206         | 2 10          |
| Cridge, A. D.           | 503         | 2 10          |
| Cumerson, Mrs. Maria L. | 171         | 5 25          |
| Donnelly, Mary M.       | 49          | 14 70         |
| Dunlap, Mrs. W. B.      | 526         | 10 50         |
| Donahue, Benj. S.       | 1141        | 507 25        |
| Bella, Charles P.       | 384         | 2,400 00      |
| Bella, Charles P.       | 1127        | 10,000 00     |
| Estey, J. C.            | 1045        | 100 50        |
| Estey, J. C.            | 1048        | 20 100        |
| Falls, Sarah            | 557         | 2 00          |
| Felton, Mrs. Maria W.   | 72          | 2 10          |
| Flak, Andrew J.         | 366         | 2 10          |
| Freese, A. J.           | 6           | 40 200        |
| Freese, A. J.           | 7           | 40 200        |
| Freese, A. J.           | 9           | 50 250        |
| Freese, A. J.           | 273         | 10 50         |
| Freese, A. J.           | 279         | 10 50         |
| Freese, A. J.           | 280         | 20 100        |
| Freese, A. J.           | 281         | 20 100        |
| Freese, A. J.           | 282         | 20 100        |
| Freese, A. J.           | 283         | 20 100        |
| Freese, A. J.           | 284         | 345 17 25     |
| Freese, A. J.           | 450         | 20 100        |
| Freese, A. J.           | 659         | 50 250        |
| Freese, A. J.           | 671         | 9 45          |
| Freese, A. J.           | 672         | 10 50         |
| Hildebrand, Henry       | 257         | 100 50        |
| Hildebrand, Henry       | 258         | 1,000 50      |
| Hoover, John D. Trustee | 981         | 667 33 35     |
| Hoover, John D. Trustee | 1060        | 433 21 65     |
| Hoover, John D. Trustee | 1061        | 5 00          |
| Holbrook, W. E. Trustee | 897         | 10,000 500 00 |
| Holbrook, W. E. Trustee | 898         | 11,000 550 00 |
| Holbrook, W. E. Trustee | 899         | 4,500 225 00  |
| Holbrook, W. E. Trustee | 900         | 4,500 225 00  |
| Holbrook, W. E. Trustee | 901         | 100 50        |
| Holbrook, W. E. Trustee | 902         | 2,000 100 00  |
| Holbrook, W. E. Trustee | 903         | 2,000 100 00  |
| Holbrook, W. E. Trustee | 904         | 2,000 100 00  |
| Holbrook, W. E. Trustee | 905         | 1,000 50 00   |
| Holbrook, W. E. Trustee | 906         | 1,000 50 00   |
| Holbrook, W. E. Trustee | 907         | 1,000 50 00   |
| Holbrook, W. E. Trustee | 908         | 1,000 50 00   |
| Holbrook, W. E. Trustee | 909         | 1,000 50 00   |
| Holbrook, W. E. Trustee | 910         | 1,000 50 00   |
| Holbrook, W. E. Trustee | 911         | 1,000 50 00   |
| Holbrook, W. E. Trustee | 912         | 1,000 50 00   |
| Holbrook, W. E. Trustee | 913         | 2,000 100 00  |
| Holbrook, W. E. Trustee | 914         | 2,000 100 00  |
| Holbrook, W. E. Trustee | 915         | 2,000 100 00  |
| Holbrook, W. E. Trustee | 916         | 2,000 100 00  |
| Holbrook, W. E. Trustee | 917         | 2,000 100 00  |
| Holbrook, W. E. Trustee | 918         | 2,000 100 00  |
| Holbrook, W. E. Trustee | 919         | 2,000 100 00  |
| Holbrook, W. E. Trustee | 920         | 2,000 100 00  |
| Holbrook, W. E. Trustee | 921         | 2,000 100 00  |
| Holbrook, W. E. Trustee | 922         | 2,000 100 00  |
| Holbrook, W. E. Trustee | 923         | 2,000 100 00  |
| Holbrook, W. E. Trustee | 924         | 2,000 100 00  |
| Holbrook, W. E. Trustee | 925         | 2,000 100 00  |
| Holbrook, W. E. Trustee | 926         | 2,000 100 00  |
| Holbrook, W. E. Trustee | 927         | 2,000 100 00  |
| Holbrook, W. E. Trustee | 928         | 2,000 100 00  |
| Holbrook, W. E. Trustee | 929         | 2,000 100 00  |
| Holbrook, W. E. Trustee | 930         | 2,000 100 00  |
| Holbrook, W. E. Trustee | 931         | 2,000 100 00  |
| Holbrook, W. E. Trustee | 932         | 2,000 100 00  |
| Holbrook, W. E. Trustee | 933         | 2,000 100 00  |
| Holbrook, W. E. Trustee | 934         | 2,000 100 00  |
| Holbrook, W. E. Trustee | 935         | 2,000 100 00  |
| Holbrook, W. E. Trustee | 936         | 2,000 100 00  |
| Holbrook, W. E. Trustee | 937         | 2,000 100 00  |
| Holbrook, W. E. Trustee | 938         | 2,000 100 00  |
| Holbrook, W. E. Trustee | 939         | 2,000 100 00  |
| Holbrook, W. E. Trustee | 940         | 2,000 100 00  |
| Holbrook, W. E. Trustee | 941         | 2,000 100 00  |
| Holbrook, W. E. Trustee | 942         | 2,000 100 00  |
| Holbrook, W. E. Trustee | 943         | 2,000 100 00  |
| Holbrook, W. E. Trustee | 944         | 2,000 100 00  |
| Holbrook, W. E. Trustee | 945         | 2,000 100 00  |
| Holbrook, W. E. Trustee | 946         | 2,000 100 00  |
| Holbrook, W. E. Trustee | 947         | 2,000 100 00  |
| Holbrook, W. E. Trustee | 948         | 2,000 100 00  |
| Holbrook, W. E. Trustee | 949         | 2,000 100 00  |
| Holbrook, W. E. Trustee | 950         | 2,000 100 00  |
| Holbrook, W. E. Trustee | 951         | 2,000 100 00  |
| Holbrook, W. E. Trustee | 952         | 2,000 100 00  |
| Holbrook, W. E. Trustee | 953         | 2,000 100 00  |
| Holbrook, W. E. Trustee | 954         | 2,000 100 00  |
| Holbrook, W. E. Trustee | 955         | 2,000 100 00  |
| Holbrook, W. E. Trustee | 956         | 2,000 100 00  |
| Holbrook, W. E. Trustee | 957         | 2,000 100 00  |
| Holbrook, W. E. Trustee | 958         | 2,000 100 00  |
| Holbrook, W. E. Trustee | 959         | 2,000 100 00  |
| Holbrook, W. E. Trustee | 960         | 2,000 100 00  |
| Holbrook, W. E. Trustee | 961         | 2,000 100 00  |
| Holbrook, W. E. Trustee | 962         | 2,000 100 00  |
| Holbrook, W. E. Trustee | 963         | 2,000 100 00  |
| Holbrook, W. E. Trustee | 964         | 2,000 100 00  |
| Holbrook, W. E. Trustee | 965         | 2,000 100 00  |
| Holbrook, W. E. Trustee | 966         | 2,000 100 00  |
| Holbrook, W. E. Trustee | 967         | 2,000 100 00  |
| Holbrook, W. E. Trustee | 968         | 2,000 100 00  |
| Holbrook, W. E. Trustee | 969         | 2,000 100 00  |
| Holbrook, W. E. Trustee | 970         | 2,000 100 00  |
| Holbrook, W. E. Trustee | 971         | 2,000 100 00  |
| Holbrook, W. E. Trustee | 972         | 2,000 100 00  |
| Holbrook, W. E. Trustee | 973         | 2,000 100 00  |
| Holbrook, W. E. Trustee | 974         | 2,000 100 00  |
| Holbrook, W. E. Trustee | 975         | 2,000 100 00  |
| Holbrook, W. E. Trustee | 976         | 2,000 100 00  |
| Holbrook, W. E. Trustee | 977         | 2,000 100 00  |
| Holbrook, W. E. Trustee | 978         | 2,000 100 00  |
| Holbrook, W. E. Trustee | 979         | 2,000 100 00  |
| Holbrook, W. E. Trustee | 980         | 2,000 100 00  |
| Holbrook, W. E. Trustee | 981         | 2,000 100 00  |
| Holbrook, W. E. Trustee | 982         | 2,000 100 00  |
| Holbrook, W. E. Trustee | 983         | 2,000 100 00  |
| Holbrook, W. E. Trustee | 984         | 2,000 100 00  |
| Holbrook, W. E. Trustee | 985         | 2,000 100 00  |
| Holbrook, W. E. Trustee | 986         | 2,000 100 00  |
| Holbrook, W. E. Trustee | 987         | 2,000 100 00  |
| Holbrook, W. E. Trustee | 988         | 2,000 100 00  |
| Holbrook, W. E. Trustee | 989         | 2,000 100 00  |
| Holbrook, W. E. Trustee | 990         | 2,000 100 00  |
| Holbrook, W. E. Trustee | 991         | 2,000 100 00  |
| Holbrook, W. E. Trustee | 992         | 2,000 100 00  |
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| Holbrook, W. E. Trustee | 994         | 2,000 100 00  |
| Holbrook, W. E. Trustee | 995         | 2,000 100 00  |
| Holbrook, W. E. Trustee | 996         | 2,000 100 00  |
| Holbrook, W. E. Trustee | 997         | 2,000 100 00  |
| Holbrook, W. E. Trustee | 998         | 2,000 100 00  |
| Holbrook, W. E. Trustee | 999         | 2,000 100 00  |
| Holbrook, W. E. Trustee | 1000        | 2,000 100 00  |

And in accordance with law, and an order from the Board of Directors, made on the 26th day of March, 1901, so many shares of each parcel of such stock as may be necessary, will be sold at public auction at the office of said corporation, in Rooms 322-323 Parrott building, San Francisco, California, on MONDAY, the 27th day of May, 1901, at the hour of 1 o'clock P. M. of said day, to pay said delinquent assessment thereon, together with costs of advertising and expenses of sale.

J. C. ANTHONY, Secretary.  
Office—Rooms 322-323 Parrott building, 825 to 855 Market St., San Francisco, California.

**POSTPONEMENT.**  
By order of the Board of Directors, the day of sale of the above delinquent stock has been postponed to MONDAY, the 24th day of June, 1901, at the hour of 1 o'clock P. M., at the office of said corporation in Rooms 322-323 Parrott building, San Francisco, California.

J. C. ANTHONY, Secretary.  
Office—Rooms 322-323 Parrott building, 825 to 855 Market St., San Francisco, California.

**POSTPONEMENT.**  
By order of the Board of Directors, the day of sale of the above delinquent stock has been postponed to MONDAY, the 23d day of July, 1901, at the hour of 1 o'clock P. M., at the office of said corporation in Rooms 322-323 Parrott building, San Francisco, California.

J. C. ANTHONY, Secretary.  
Office—Rooms 322-323 Parrott building, 825 to 855 Market St., San Francisco, California.

**POSTPONEMENT.**  
By order of the Board of Directors, the day of sale of the above delinquent stock has been postponed to THURSDAY, the 15th day of August, 1901, at the hour of 1 o'clock P. M., at the office of said corporation in Rooms 322-323 Parrott building, San Francisco, California.

J. C. ANTHONY, Secretary.  
Office—Rooms 322-323 Parrott building, 825 to 855 Market St., San Francisco, California.

**INVENTORS, Take Notice!**  
L. PETERSON, MODEL MAKER,

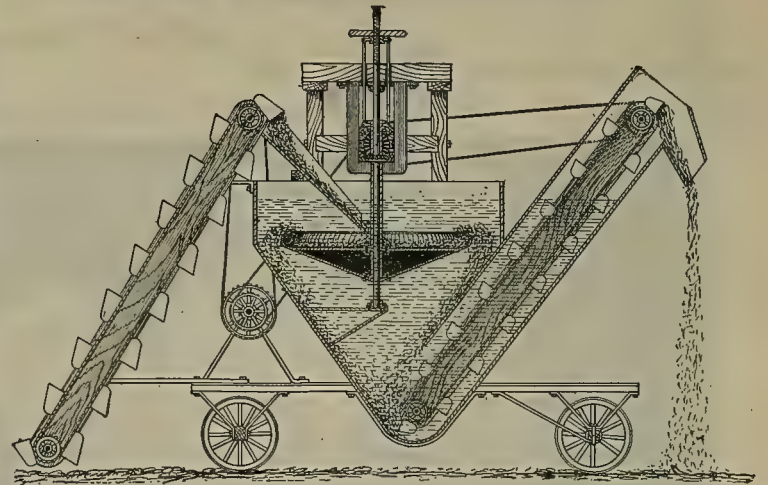
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The "Wonder" Placer Mining Machine. The machine for which the mining world has been waiting. The only Practical and Perfect Placer Machine in existence. LACK OF WATER IS NO LONGER AN OBSTACLE TO PLACER MINING. A 1-inch stream will furnish ample water for a 50-ton per hour machine.

CAPACITY FROM 2 TONS TO 200 TONS PER HOUR.



The above cut gives a sectional view of the "Wonder" Placer Machine as it appears in operation.

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## CAPACITY.

The capacity of the "Wonder" Placer Machine is its most surprising feature. No other placer machine ever invented can approach it either as a gold saver or in handling the ground.

The actual capacity of our machines is, under favorable conditions, from  $\frac{1}{2}$  to  $\frac{1}{2}$  greater than advertised.

For handling the Tailings from Stamp Mills, or for separating the free gold from the ores pulverized by either wet or dry process, the "Wonder" Machine is without an equal.

Every practical mine operator and expert who has seen our "Wonder" machine in operation concedes that it is the greatest machine in existence.

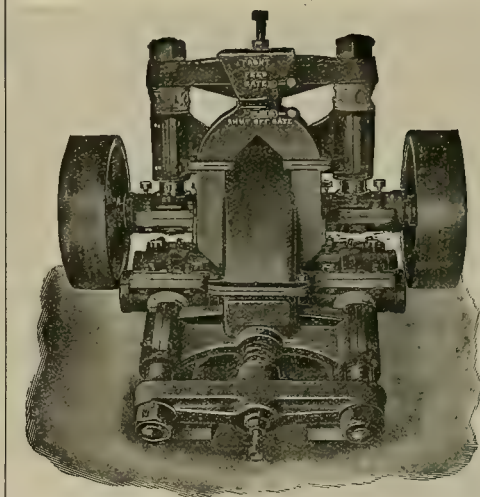
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The International M. & D. Co., Canton, O. MATAPE, SONORA, MEXICO, April 23, 1901.  
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Respectfully,  
T. E. ANDREWS.

ELKHORN, COLO., April 13, 1901.  
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Respectfully,  
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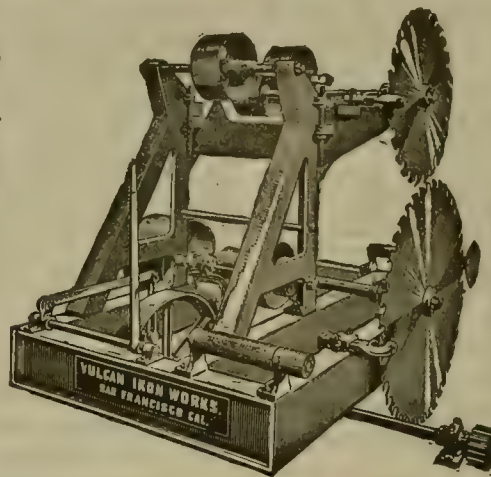
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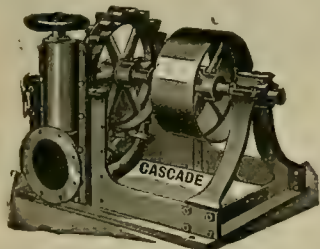
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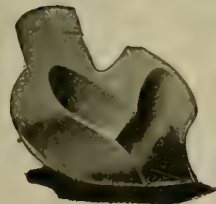
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 Author of "Hints on Amalgamation," etc., etc.  
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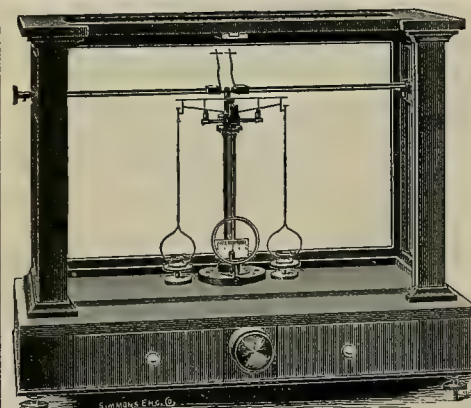
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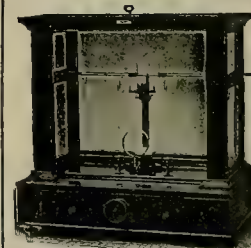
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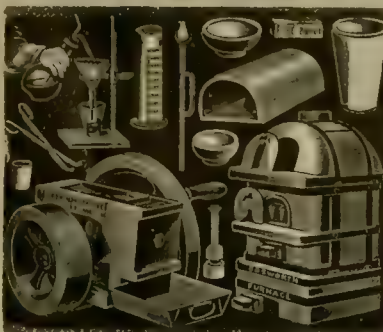
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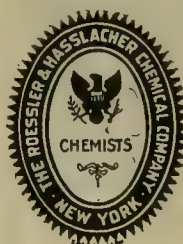
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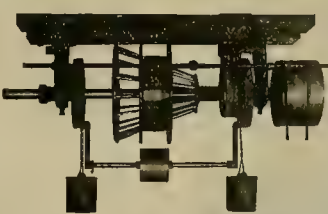
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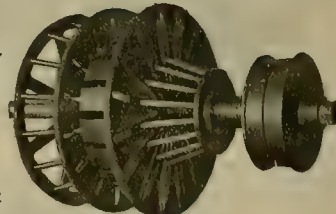
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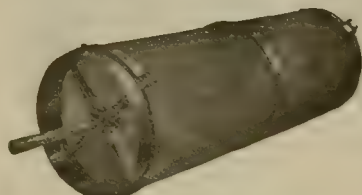


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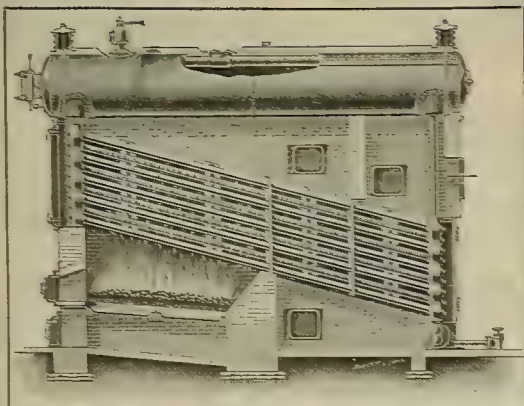
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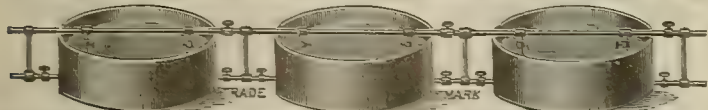
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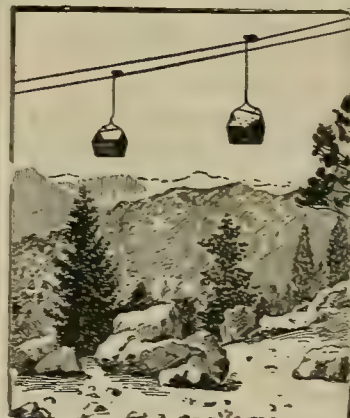
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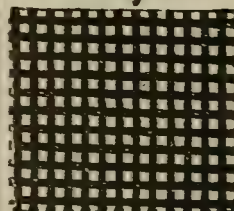
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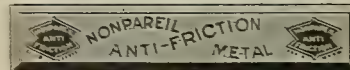
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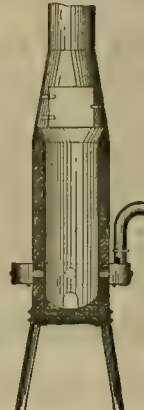
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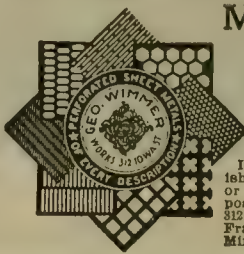
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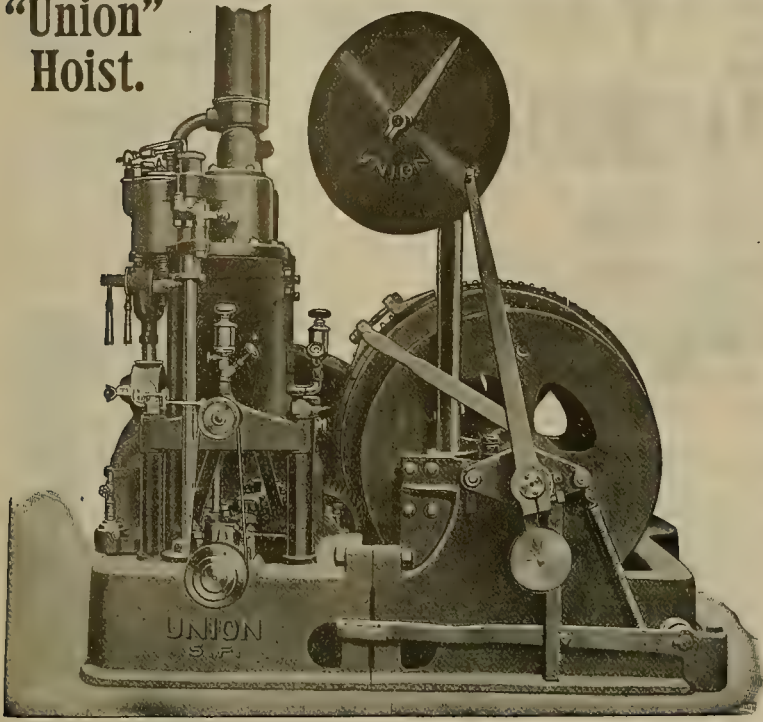
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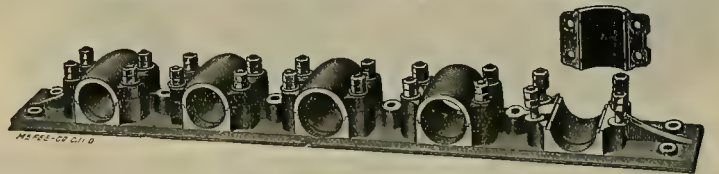
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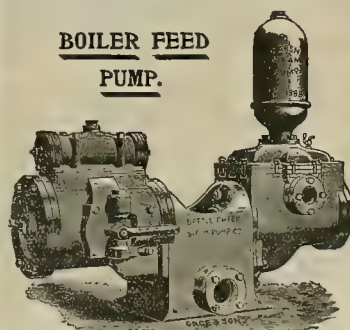
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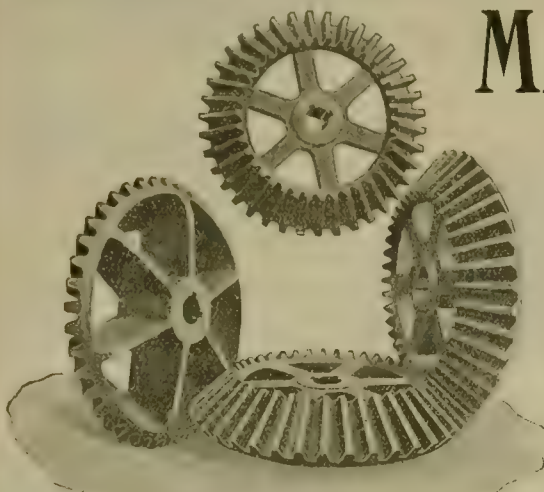
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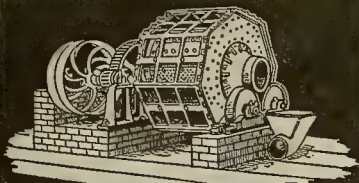
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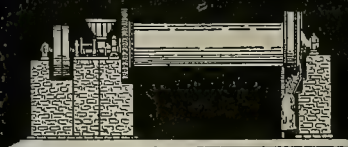
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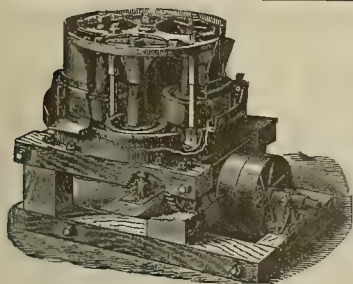
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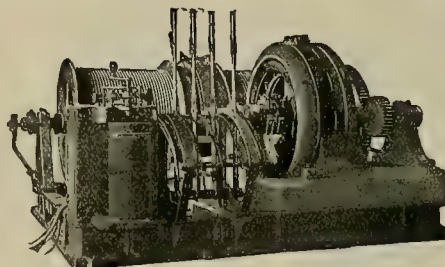
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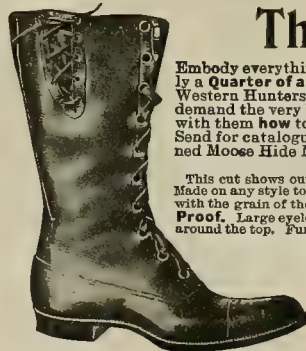
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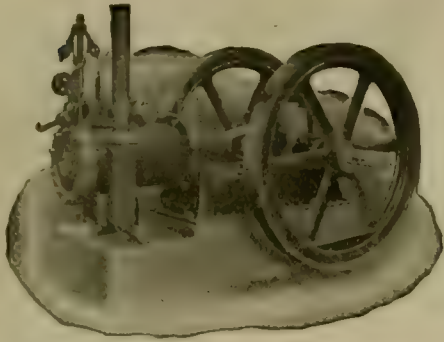
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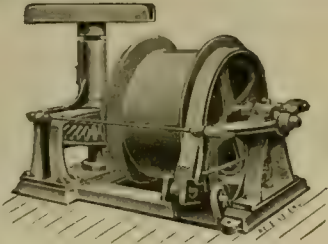
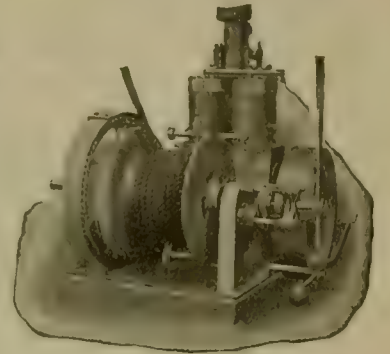
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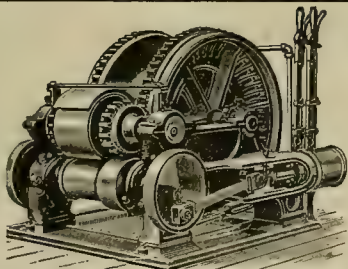
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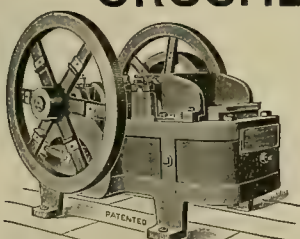
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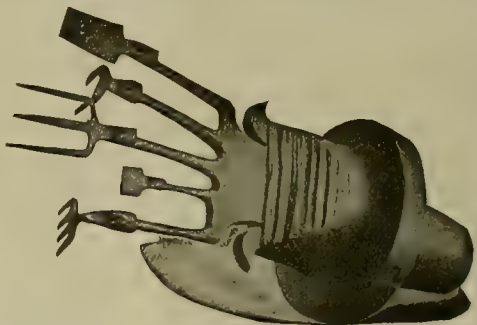
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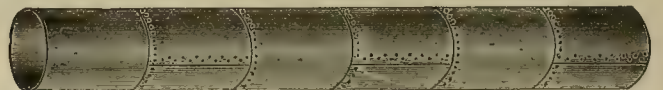
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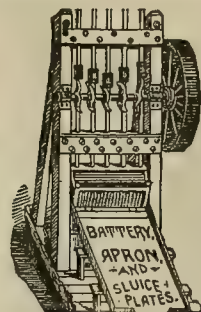
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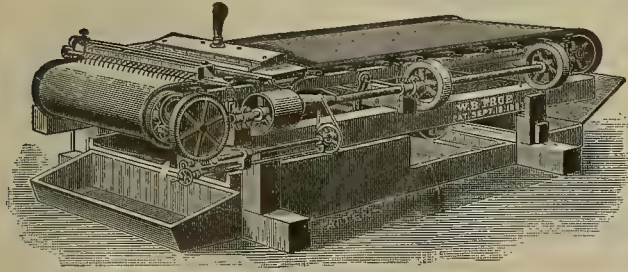
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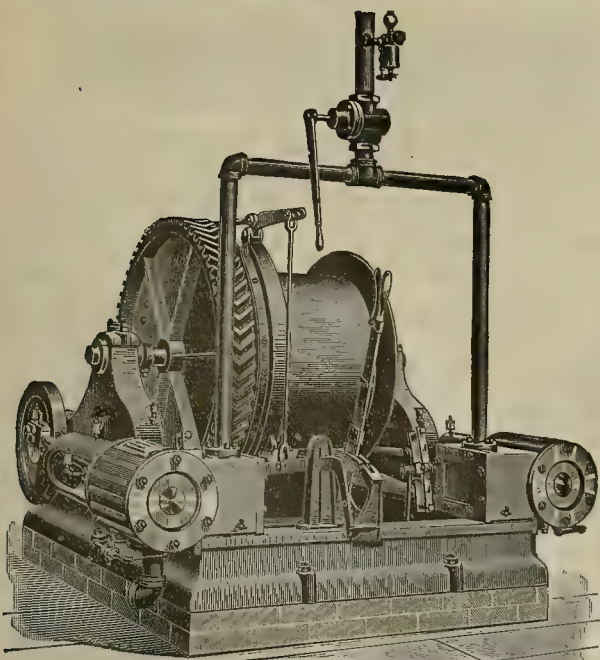
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## Illusions of Mining.

The accumulation of capital seeking employment as an evolutionary result of the general application of more exact and scientific methods to the carrying on of the agricultural, manufacturing and distributing industries has made a great and significant change in the relation of the mining industry to the general aggregate. A very few years since mining was regarded by the owners of this capital as a speculative and hazardous occupation, closely allied to gambling. It was not considered "legitimate" business; and in the older communities, if a business man of supposed moderate fortune became known as interested in a mine, it immediately suggested questions as to his solvency. It was suspected that the inducement to mine was a hope of recouping by for-

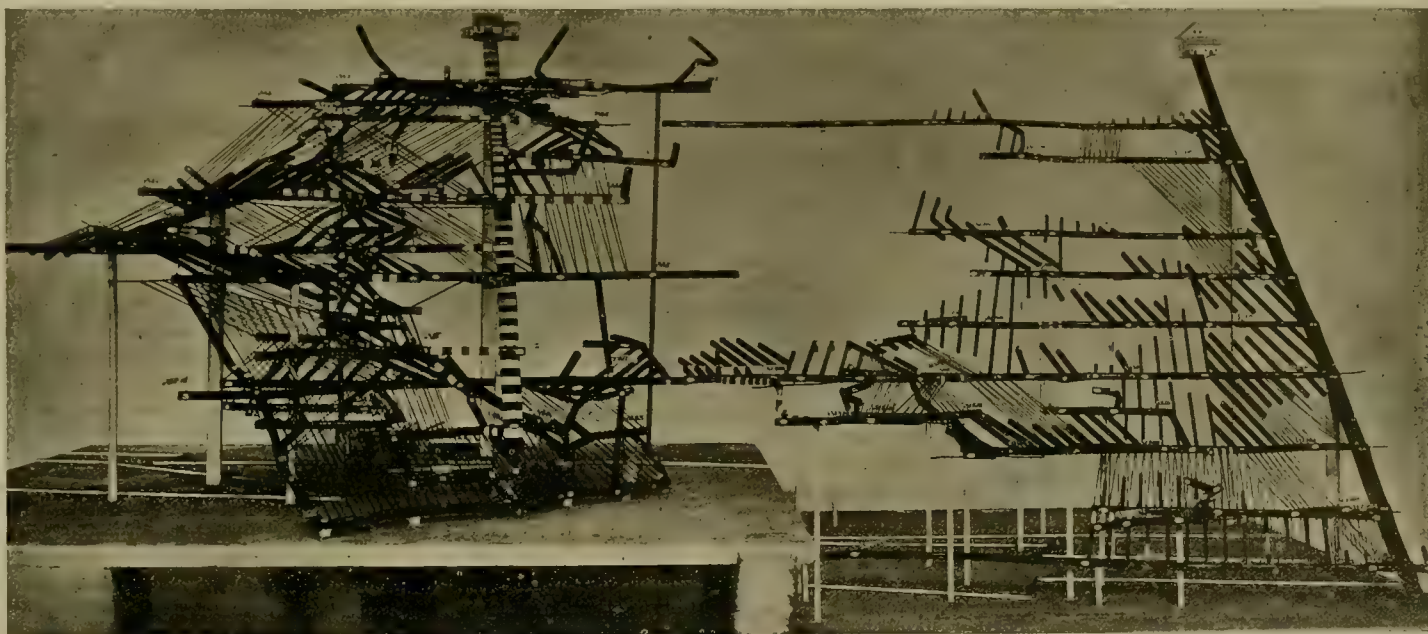
little in mining investment is too small to be a legitimate chance. At the other end the tendency is to give too much, to overlook the fact that the mine must not only give income, but must return within its life the principal sum of investment as well.

The fact regarding all mining business, with the exception of certain kinds of gold mining, is that the same economic laws apply as with other industrial businesses, and the same exact and scientific methods are not only applicable, but should always be applied. There are differences, it is true, but the differences are of detail of application of the methods and not of the principles.

Certain kinds of gold mining, placer mining and lode mining, where the recovery of the gold is economically independent of other metallurgical operations, are in a class by themselves. The problem of

neglected. It means mills and smelters for mines. It means the development of mines that carry gold enough to pay cost charges of reduction of the other metals as compared with mines that carry no gold.

The development of competition in mining and commercial organization to make it accomplish its object has been far more rapid than the general public comprehension of the effects. It has proceeded from the manufacturing and selling end of the business, taking next the metallurgical and reduction portion of it separate from the mining, finally including the transportation branch it is including the mining as far as needful to complete the economic unity. It has been based on the economic truth that the certainty of profit, economy of flat costs, and ability to withstand competition, were the most surely made certain when only one profit had to be provided for, when



View of Model of Ore Veins and Works G. V. Ex. Co. and Penn. M. Co., Grass Valley, Cal. (See page 44.)

tunate speculation some large losses made in what was termed "legitimate" business.

At the present time the point of view is in a transition stage. Mining is regarded as a legitimate activity for capital equally with agriculture, manufacturing and distribution. But the mass of people, whose capital is now turned to it for the chance of reproduction which in the other business is denied, consider mining as an occupation to which the economic laws that determine the measure of success in the other businesses do not apply. Its opportunities by them are gauged from the great speculative successes of its past history rather than from the average of all the enterprises. As a consequence, mistakes are being made and economic wastes incurred at both extremes. Prospects which may become mines, but which, if the average percentage of successful prospects to the whole number be considered, are far more likely not to become mines, have their possible future discounted precisely as if they were mines. At the other end a mine with ore bodies blocked out and values approximately measurable is invested in on the basis of income returns being assured indefinitely.

Both extremes are taking needless and unwarranted risks. The chance of a great deal for very

their mining is simple and direct. The recovered gold is the money of the world. Its money value is fixed and independent of supply and demand. Investment in mining rests simply on the proposition of not giving all of the recovered gold up as the cost of the recovery. There is no competitive production to protect against.

The mining of silver, copper, lead and other metals, particularly where associated with gold, is a commercial proposition dealing with variables at both ends. Competition in production is ceaseless. Invention is continually seeking cheaper substitutes. The tendency is continually to the leveling of percentages of profit. With these metals there is not only the risk of the mine, but the risk of the business as well. The investment in their mining must, therefore, be made conformable to the same economic principles that have made profit in other business. There is no waste too small not to be worth saving in mining. Every mine should be studied and developed as if it were a manufacturing business. Just exactly as the general business tendency is toward completion of all the steps of production from raw material to delivery to the consumer, by the producer of the raw material, so is the particular tendency in mining. It is a factor in mining business that cannot be

the mine was regarded merely as a natural storehouse of raw material. Therefore it is that while the profits of the mining business have increased and have been made more assured the profits of the mines have been if anything decreased and made more uncertain.

The mistake of the public has been to regard the first as if it were the second and to expect from the exploitation of mines what is being gained from the establishment of a mining business. Silver and lead mining as controlled by the close organization of the smelting and refining industry clearly shows this. The profits of the combination, the established business, are reported to be increasing. At the same time the sale prices of silver and lead are falling and with them the profit of lead and silver mine exploitation. Copper mining as an established business is largely profit earning, but the promoters of the establishment have taken the profits of that establishment, and the real problem of copper mining for people who would make the same profit is not the exploitation of a copper mine only, but the establishment of a copper mining business, the basis of which must be more cheaply produced copper, meaning richer mines than possessed by the present established business.



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## Relation of Transportation to Mines.

One of the subjects discussed at the recent meeting of the Mining Congress at Boise was transportation of ores and metals. There was the declaration of a grievance—that many metal discoveries could not produce earning for their owners because the charges claimed for transportation service required so much of the metal product for payment that there was none or too little left for the owners' profit. There was an intimation of organization to effect a remedy—the mine owners are to work to organize all the industrial forces of the country interested in the subject for an effort to control or regulate the transportation business—presumably through political action.

The grievance has been declared before, not only by miners, for their industry, but by farmers, by manufacturers, by merchants, for their respective industries and occupations. It is invariably in evidence that the grievance appears with diminishing or disappearing profits in production or service. Also that, as a grievance, it is always independent of the real cause of the diminishing or disappearing profits. Perhaps the transportation business is indirectly responsible for the distortion of intelligence with which it is regarded. As a rule, its distribution of charges is not based on the cost to it of the service rendered, but on the margin of profit to the producer there is in the production that is transported. Knowing this, the producers permit it with approbation when there is left something for themselves; but when profit margins shrink from any cause, they expect the transportation business to carry the loss. Every locality can think of particular instances of the general proposition.

The grievance of the petroleum producers of California is excessive transportation charges on their production. If a true grievance, it existed just as certainly when oil at the wells was worth \$1 a barrel; as now, when oil is worth at the wells 25 cents a barrel; but, as a grievance against the transportation business, it was not declared until overproduction of petroleum, making competition between producers, wiped out the profit margin.

The grievance of the wheat growers of California is excessive local transportation charges. Just as with the petroleum producers, if truly a grievance with wheat on board ship worth 70 cents a cental, it was equally so with wheat on board ship worth \$1.20 a cental; but, as a grievance against the local transportation business, it is only declared with the disappearance of profit. The real cause, or the principal item of the total of several causes, is the development of the petroleum production in California,

which, displacing coal, has forced ships which formerly brought coal to California and took wheat away, to make their full earning from the wheat transportation alone, thus doubling the quantity of the wheat which is required to make the payment.

The transportation business is engaged in for the purpose of making profits. Whatever opinion may be as to the real relation of this business to the production of a country, and as to the principles on which the charges of its earnings are apportioned on different productions and services, the fact of its individual dominance over production and the principles of apportioning charges that it applies must be counted as established economic facts. They must by miners be taken into account as they are, not as the miner would like to have them.

Mining is also an industry engaged in for profit. Like other businesses, it must carry its own costs and risks. It has no preference over any other. It must itself pay as one of those costs, charges of transportation. Roads and railroads that are built based on expectations of profit from mining transportation have a right to the opportunity for those profits, and the fact that the earning power of a mine production diminishes, either as a consequence of the decreased unit metal content of the mine or decrease in the selling value of the metal unit, is not an equitable basis for a grievance against the transportation business. It is simply one of the risks that must be carried by the business. On the other hand, it may be a legitimate cause for the exercise of business policy by the railroad. There is a distinction.

Undoubtedly, as speakers at the Mining Congress declared, there are enormous minable deposits of valuable metals that have been discovered and appropriated, that the owners are unable to realize earning from, because the facilities for transportation either do not exist or the service of existing facilities in charges for payment takes too large a proportion of the metal. The condition, however, is not properly a grievance against the transportation business, nor a reason for the remedy proposed.

Stripped of sentiment and sophistry, the proposition is really a demand that the public give by the exercise of its political power to the owners of these mines such a rebate on transportation charges as shall enable the production of these mines to enter into competition with the mines that now have the established business, and which do not now receive gifts from the public but pay their own costs of transportation. There is no equitable or logical reason why the public should provide a bonus in transportation charges to one producer in mining rather than another, or indeed to any producer.

If the contention for the political aid of the public is based on the discrimination of the transportation business, which is a public utility, against the production of some mines to the advantage of other mines, it becomes another issue calling for the police power of the public, not for its charity.

The weakness underlying the whole condition is the idea that some way or other, the other fellow, the public, must be made to pay for what in the end is solely a private gain to some individuals of a special class. The vaguely and indefinitely expressed reason of public fostering of a special industry, the mining industry here, for a supposed public gain is fallacious. The expression of the public gain is not true. The thing actually meant is a real gain for the individual for which nothing is given to the public.

The real difficulty with which the owners of the metal deposits, who declare their grievance to be the transportation business, is that to work the deposits as mines will not pay because the metal cannot pay the unit cost charges under existing commercial conditions. The real problem for the owners is to reduce the costs themselves, if practicable. If impracticable, the metal deposit is not a mine. Industrially, the proposition must be examined to know if it will stand the commercial organization of similar metal mines against which it competes. The transportation of waste must be eliminated. Whatever new transportation facilities have to be created must be considered from the standpoint of ownership as part of the mining business.

In conclusion, mining is not an infant industry, and any metal deposit that requires nursing as a public charge is not a mine. The public have a right to consider the maintenance of an established mining business as of equal importance to the making of a

new business of the same kind at public cost for private benefit. The grievance of the owners of these unavailable metal deposits cannot be logically maintained. The proposed remedy has no standing either in morals or business.

## A Proposed Amendment to Lode Location Law.

In a paper read at the late meeting of the Mining Congress, W. B. Heyburn of Wallace, Idaho, proposed an amendment to the law of mining claim location, to avoid conflicts arising from errors in location due to uncertainty as to the strike of the apex of the lode. He proposed that all the end lines of locations on the same lode should be located parallel. To effect this, his suggestion was that the first locator on a ledge should claim a discovery of a new ledge, and the nearest U. S. deputy mineral surveyor should thereupon go to the claim, establish its strike by survey and fix the end lines. Subsequent locators should then be compelled to make their end lines parallel to these first established.

The principal objection to the proposition is that it could not do what it is devised for. Its proponent has failed to appreciate that it is a means of absolutely knowing the apex that creates the difficulty. It is not the lack of means of definition after it is known. The law as it exists is based on the theory that the apex is a fact capable of exact indisputable determination. Experience and knowledge have shown the theory at fault, and more and more at fault as knowledge extends. It is absurd to continue basing our rules of location on a theory known to be false. The adoption of Mr. Heyburn's proposed amendment would only make a bad matter worse.

The suggestion to require that locations should be made square and without extralateral rights, as this paper has presented it, is not answered by the objections he makes. The square form is a detail. It can be a rectangle, a triangle or any form of surface. The essence of it is in the limitation of right to the minerals to vertical bounding planes. It can not affect a vested right to extralateral rights already acquired. The rights to the mineral in the new location would be subject to such extralateral rights of entry and mining from the old form of location.

The gain is in the future; one of the new locations could not conflict with another one. The objection that the dip of veins would carry it outside the vertical bounding planes at too great depth to be desirable for location does not seem well taken. It is a question of probable pay. The discoverer of the mineral in place being entitled to the initial exercise of the right of location, the owner of the adjoining location who follows underground the valuable mineral from his location on to the other ground is the discoverer and has the prior right of location. Mere deductive influence that there is valuable mineral in the ground does not provide the legal basis of a location if it does supply the incentive to acquire that right by digging for and discovering that mineral at depth. Under the present law the valuable minerals do not stay put by location merely. Ore shoots have a dip with the lode strike as well as transverse to it. So dipping the ore shoots' cross-end lines of locations and in some actual instances are in precisely the relation that is objected to as a consequence of limitation of mining rights by vertical planes.

The Eureka-Idaho-Maryland lode of Grass Valley, Cal., is an instance directly in point. The shoot apex was in the Eureka, which was mined out early. Dipping in the strike, it entered the Idaho far below the surface and was mined out there. Still dipping, the shoot crossed the end line into the Maryland claim and is being mined there at the present time. It is notable that the vein does not outcrop at all on the Maryland location, but only appears at several hundred feet in depth. Its richness was such that as a commercial proposition the risk of sinking a shaft to discover it was warranted.

Project consciousness in advance and consider the suggested change as being the law in operation, the tendency would certainly be toward rapid exploration of deposits in order to get the advantage of discovery underground. The necessity of discovery as the basis of initiation of location would block mere obstructive occupancy of mineral land.



## The Memorial of the British Columbia Mining Association.

The British Columbia Mining Association, an organization of metal mine owners of the Province of British Columbia, has sent a memorial to the Governor-General-in-Council of the Dominion of Canada asking from the superior sovereignty of the Dominion of Canada a radical measure of relief from cost burdens imposed on their metal mining industry by the lesser sovereignty of the Province of British Columbia, to which the metal mining industry complaining is immediately politically subject.

The occasion of the memorial is successive cumulation of the effects of the legislative acts of the British Columbia Legislature during the last four years which has added so largely to operative costs of product that metal mining profits have been largely wiped out entirely, and what was originally a profit-earning business is now, as a whole, conducted at a loss. Capital invested in the mines has shrunk in exchange value till investment has been made uncertain and undesirable. All but a few mines have shut down. The industry is distinctly declining.

The claim is advanced that the legislative acts complained of had no warrant in public necessity but on the contrary that they were unnecessary and, it is plainly intimated, even designedly mischievous.

The British Columbia mine owners are to be commended for the square, direct declaration of the existing condition of their metal mining industry, the unqualified yet conservative statement of the facts that constitute the indictment, and the dignity of their appeal to a superior sovereignty for the equity that is denied them by the misguided beneficiaries of their thrift and industry. The condition is not the only example of its kind, though unquestionably the worst example. It is notable as the first occasion on which the condition was directly met by a true statement by the people interested. Usually the truth is suppressed and activity confined, not to correcting the condition, but to passing the burden of its cost on to others.

In detail the particular statements of facts and figures made part of the memorial are in substance as follows:

1. The taxes collected by the Dominion and Province from the metal mining industry during the fiscal year 1900-01 are declared to roughly approximate \$2,572,275 from a total metal value production of \$11,348,481 or 22.7% of the whole. In the direct incidence of this taxation the bulk of it goes directly on the production or the mine owner. There are specially enumerated: custom duties, which it is claimed increase operative expenses by 12%; the 2% on output, which takes from 6% to 12% of the net earning from medium and high-grade ores and wipes out entirely any net from the mining of low-grade ores, stopping their mining entirely; excessive fees for incorporation, registration, boiler inspection, recording, transferring title, miners' license, timber dues and others.

2. Oppressive, unwise, personal legislation, which has been added to by each successive Provincial Legislature: the eight-hour law, which has increased the cost of underground labor about 16%, and which has led to friction and separation of interests between employers and workmen, and has developed a class antagonism, which has led to the incessant urging of further class legislation. Unwise technical provisions in Mines Inspection Act, for example, the code of signals for shaft hoisting, which not only endangers life needlessly but restricts the hoisting capacity, thereby making it more costly. Acts, including the Alien Act, which make the obtaining of labor from outside the Province impracticable.

An examination of the preceding for first causes indicates conclusively the real source in personal legislation, the kind of legislation which has for its motive the taking of the personal property of some people for the ultimate if not immediate personal benefit of other people. The opportunity is the possession of the political power to legislate, associated with misguided intelligence and lack of responsibility to society as a whole. The last, concretely defined, is a corrupt Legislature, a majority of the people electing the Legislatures, who, while not at heart corrupt, allow themselves to be misguided.

The mines were rich. They were sought for by foreign capital. The mines and capital could pay large taxes, so the public has plucked both excessively to pay these taxes. For the easy enrichment of officials excessive and unnecessary fees have been imposed and collected. The workmen took their share of the loot in higher wages and fewer hours, each interest glutting on what it had still demanded and took increasing sums. At first the foreign capital paid, and wrote off what it paid as simply more investment. Now when the capital should be going back as metal production it is realized that to pay means that the investment will produce neither income nor come back itself.

British Columbia people are very largely people who labor for wages. A large proportion are late comers with no property interest in the country. The wage earners have been and are now so largely associated into unions that the unions are the dominating force in industry. They are as well the dominant political power and are responsible for legislation in British Columbia. The condition complained of as industrially impossible and unbearable by the owners of the metal mines is the natural, inevitable, logical result of such industrial dominance. There is a lesson in the condition to be learned in other places as well as in British Columbia. The city of San Francisco is at this moment the scene of a physical effort on the part of a labor union to obtain industrial dominance. What seems to have grown naturally as a weed in British Columbia is in San Francisco an exotic requiring force to make it grow. But if grown it will inevitably produce the same crop in San Francisco that is being harvested now in British Columbia.

The steps from industrial dominance to political dominance are possible, as British Columbia instances. The inevitable destruction of industry is shown by the condition of industry in British Columbia to-day. There is nothing to show that labor has correspondingly gained at the end of its run. The strike at Rossland, closing down the largest mines in the Province—the mines paying the highest wages and the largest proportion of metal output in wages—is a natural result of the irresponsibility of labor union dominance. Against a declining industry, it is clearly to be seen it could give nothing to the strikers that the strike was ostensibly a demand for. But it could hasten either one of two ends—either the end of the mining industry or the end of the labor union dominance. By the coming of either end the labor union must lose.

The memorial is specific in its statement of the particular acts—legislative and industrial—which have practically destroyed the metal mining industry of the Province. It is to be regretted that the memorialists did not clearly see and as directly declare the real basic cause of the condition. The acts were but the expressions of the cause. The cause was misguided, irresponsible, labor unionism.

The real labor union is not in the association of the men who labor in a particular trade or in a particular aggregation of trades. It is in a union of men who work for wages with the men who work capital, and its unit is an individual established business. The former idea developed, tends to drive men into classes with the direction for the individual ever downward. The latter idea tends to merge the classes with the direction for the individual ever upward. Are British Columbia workmen any better off now that they have created a condition which has separated them from the capital they were closely associated with four years ago? Will San Francisco workmen be better off when they have separated their interests from the capital which employs them? It might be noted that capital has practically left British Columbia, while the workmen remain—with the husks.

The Government of the Dominion of Canada should grant the Royal Commission of inquiry the memorial asks for. Its inquiry and the action of the Dominion Government should both go deeper than the surface effects. The underlying cause should be dragged into the light of free, fearless discussion and should be directly dealt with. Not alone to the memorialists will an equity be granted but organized society and industry, the State, will have the benefit that comes with the replacement of an economic error by the economic truth.

## Concentrates.

THE weight of a cubic foot of a natural bituminous rock, a sandstone with the voids filled with asphaltum, is from 120 pounds to 140 pounds.

SEA WATER has not been found in practice as satisfactory as fresh water for concentrating sulphurets. The poorer service seems to be due to the sea slime.

THE Secretary of the Interior has ruled that in obtaining a patent for a mining claim a mill which is situated on another claim cannot be credited to the first claim as improvement to establish the \$500 of expenditure required by law as a condition precedent to patent. The ruling was based on the argument that a mill, while an indirect benefit to a mining claim, yet it is of no direct benefit or aid to the actual development of the claim.

THE chief essentials to the production of high-grade Portland cement are the correctness of the proportions of the ingredients, thorough mixing and fine grinding of the raw material. A variation of one-half of 1% of the carbonate of calcium will affect the product. If too high in lime, the cement will expand and crack; if too low, it will be quick setting and lack in strength. Either defect, or both, at the same time may result also from imperfect mixing and grinding.

A LARGE English steamship building works has constructed one moderate sized steam vessel with steam turbines for its engines for commercial use in the English channel crossing, and offers to construct such vessels of any desired size for commercial service. It is probable that this advance in successful marine practice, the engines heretofore having been considered unavailable for commercial use owing to excessive fuel consumption, will shortly result in the development of economical types of these steam turbines for service as stationary prime movers.

A DITCH immediately on its completion has a less coefficient of water delivery than after it has been in use for one or more years. The loss by seepage is much greater at first. In time two results are obtained—silt works into the crevices and joint planes and stops the leakage of water through them, and the material, rock or earth, of the wet perimeter becomes saturated with water and receives less from capillary flow. A new ditch should not have its full head turned into it at the start. The turn-in should be small and gradually increased through several weeks, or even months, to the maximum. It is desirable to turn muddy water in at first, and until the maximum quantity is reached, to aid in closing up the seepage lines.

THE middle line of a tunnel being declared to be the division line between two ownerships on a ledge, and the tunnel itself not extending to the ledge, the prolongation of the middle line is the division line. If the tunnel is not straight, the prolonged middle line is the prolongation of the middle line of the straight section nearest to the ledge. If the nearest section instead of being straight is a turn or curve, the prolonged line of division is a tangent to the curve. In rock work of mining tunnels no such exactness of work is done that curves and tangents to them are absolutely determinate. There are limits of reasonable difference such that property interests dependent on their determination are within those limits matters to be adjusted by compromise.

IN shooting down holes in mine blasting, a substitute for tamping and a modification of the method of loading that successful use has demonstrated to be an improvement, consists in the use of water. The hole after being cleaned out thoroughly is filled with water. The paper wrapping of the powder sticks is removed and the powder is dumped into the water and sinks through it to the bottom of the hole. The primer is put in and the paper then is pushed through the water till in contact with the powder. So loading, the powder charge is compacted in the bottom of the hole, the strongest part; and a charge that loaded the ordinary dry way would fill 20 inches depth of the hole is compacted into 8 or 10. The water does not seem to affect the explosive power of the powder, and its position at the bottom of the hole adds to its power for breaking the rock.

A FLOWING STREAM applied to operate a current water wheel will develop power determinable as to amount by the same rule as would be used if it were developed by the discharge of water from a pipe against the buckets of a Pelton type of wheel. The velocity per minute of the stream impinging on the submerged blades of the water wheel is measured and the area of the submerged blade. From the velocity per minute the velocity in feet per second is obtained by dividing by 60, and the head or fall required to produce the fall is either taken directly from a table or calculated from the formula—head in feet equals 64.4, divided by the square of the velocity in feet per second. Then the head or fall of the water, multiplied by the area of the immersed blade of the wheel, multiplied by the velocity of flow in feet per minute, multiplied by 62.4 pounds (weight of cubic foot of water), divided by 33,000, gives the theoretical horse power. The effective horse power is, at its maximum, three-eighths of this for the current actuated water wheel, while 80% to 90% is effective with wheels of the Pelton type. Comparative tests for efficiency of a particular current water wheel should take this last figure as a standard.



## The Pennsylvania M. Co. vs. Grass Valley Exploration Co. Litigation.

Written for the MINING AND SCIENTIFIC PRESS

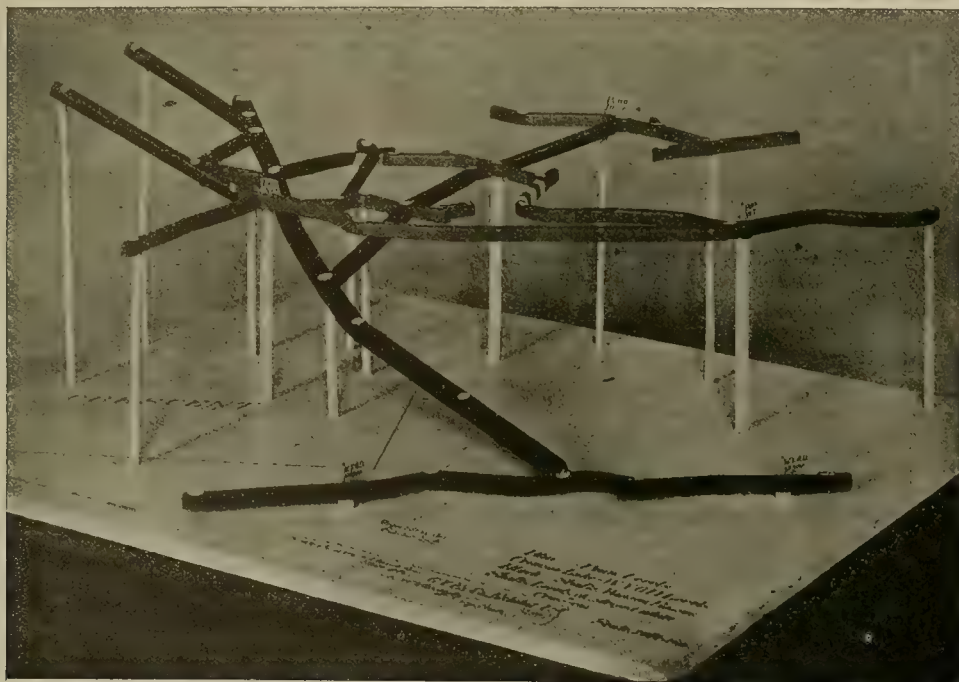
On this and the first page of this journal two illustrations—views of models used in the recently tried contest in the U. S. District Court at San Francisco between the Pennsylvania M. Co. and the Grass Valley Exploration Co.—show some very interesting phenomena of lode occurrence. The two mines are situate adjoining at Grass Valley, Nevada county, Cal. The models were prepared by the engineers of the Grass Valley Exploration Co. and, checked by the engineers of the Pennsylvania Co., were accepted by it as showing the facts, which were not contested. Issues were joined on their definition and interpretation.

In the illustration giving a general view of the underground openings of both mines and the respective veins exploited the mine works and veins shown on the right, and extending behind the plexus of works and veins shown on the left, are the works of the Grass Valley Exploration Co. and the ore vein claimed by it. The works and veins shown at the left, in front of the other, are the works of the Pennsylvania M. Co. and the veins claimed by it. It will be noted that the photographed string lines showing the latter veins and the blocks showing the mining works of the Pennsylvania M. Co. join into the plane

or, as the Pennsylvania geologists claimed, making one continuous vein in what can be compared to a series of steps.

Both companies passed their side lines in their underground works, coming under agricultural and townsite patented lands, which were subsequently bought by the Grass Valley Exploration Co. and used as the basis of a suit in ejectment against the Pennsylvania Co. The latter brought a separate action against the Grass Valley Exploration Co., claiming the apex of the vein.

The principal issue of interpretation that was joined was whether the lines of merging and crossing of veins having different lines of strike were junctions or intersections. The plaintiff's claim, by its geologist, was that the filling of the fissures with different strikes at the same period of time would make the mergings or crossings junctions, and the continuous line of the two or more, a single vein. The defendants claimed that the filling of the fissures at the same period was not material and did not determine identity. Their geologists divided the claimed continuous apex line of the Pennsylvania geologist into different intersecting veins, the apex lines of which they projected crossing the side lines of the Pennsylvania claim, the establishment of which would deprive the Pennsylvania claim of extralateral rights in the direction of the vein claimed by both. In opposition to the theory of step continuity advanced by the Pennsylvania side, the Grass Valley Exploration Co.'s geologists claimed that the phenomena of opposite dipping veins or feeders were the fillings of fissures



View of Model of Intersecting Veins and Works G. V. Ex. Co. and Penn. M. Co., Grass Valley, Cal.

of the vein claimed by the Grass Valley Exploration Co. at the bottom of the view. Below the line of joining only one vein line is declared developed. The ownership of this portion of the vein is in dispute and is the occasion of the litigation. The fact to be interpreted by the court from the geological structure is the answer to the question, broadly stated, Which of the veins above the line of the presumed separation into two veins is the upward continuation of the fissure of the single vein into which the underground works of both mines have advanced? That is to say, which of the two lines of ore-bearing rock at the surface on which the respective mines were located is the apex of the deep-lying lode?

From the testimony it appears that Kate Hayes hill, upon which both of the mines are located, was dug over the surface in the early days in placer mining principally, but to some extent in prospecting and mining quartz. These old workings practically obliterated the old apex lines so far as indisputable outcrops of quartz are to be identified. The absence of surface outcrop in the Grass Valley mines at the present time is common. The view was advanced that erosion had taken down perhaps 3000 feet of depth of Kate Hayes hill from its original structure at the time of the vein formation.

The report of the U. S. Geologic Survey, and the maps of it, show on Kate Hayes hill a series of approximately parallel quartz-filled fissures in the grano-diorite striking northwest and southeast, and in the vicinity of these two mines dipping southwest. In the prolongation north and south on the strike the dip is reversed, being toward the northeast.

Both the W. Y. O. D. shaft of the Grass Valley Exploration Co. and the Pennsylvania shaft are sunk on veins dipping to the southwest. In the underground works of both veins were discovered, striking differently from the supposed apex, lines running through the locations. Veins were also found in the explorations of the Pennsylvania Co. having the opposite dip, and connecting successive parallel veins,

of the other system, reference to which has been made above.

The illustration on this page is of a model showing workings of the Grass Valley Exploration Co. on one of the differently striking veins discovered in the underground exploitation, and intersections made by the Pennsylvania workings.

On the Pennsylvania side Ross E. Browne was the geologist, and W. F. Englebright, assisted by E. C. Uren, did the engineering work. For the Grass Valley Exploration Co. Louis Janin, W. S. Keyes and H. W. Turner were the geologists, and Mark B. Kerr, assisted by J. A. Jenkins and Karl F. Hoffman, did the engineering work.

### The British Columbia Mining Association's Memorial.

The Rossland Miner, referring to a memorial which has been presented to the Dominion Government by the British Columbia Mining Association, says: "It is unnecessary that we should indulge in much comment at the present time. No one who reads it can doubt that it is a very important document. It is asserted that the sum total of the artificial burdens due to human enactment which have been placed upon the mining industry in British Columbia is not equalled in any mining region in the world. That is an allegation sufficiently alarming, in all conscience; and all who have the true interests of British Columbia at heart should study the memorial in an attempt to ascertain if that allegation is founded on good reasons. We think that it is. That a crisis has arisen in connection with mining development in this province is plain from the concluding paragraphs of the memorial, which are as follows:

"In individual capacity, and as an association, we have repeatedly informed the Provincial Government of our distress and petitioned for relief. These requests, together with those for a commission to investigate the industry, have hitherto persistently

and invariably been ignored. So far from having any prospect of relief, every session of the Legislature sees new additions to the load, and still more severe legislation is being urged.

"Generally speaking, there is little hope for proper security for investors in British Columbia mines until this policy is changed and radical measures for relief adopted."

### The Sulphide Ore Problem.

Written for the MINING AND SCIENTIFIC PRESS by JAS. W. WORSEY.

Possibly no subject has occupied so much of the attention of scientific men of late years as the method of treating successfully the valuable mixed ores known as zinciferous lead sulphides, so abundant in many parts of the world, but very particularly so in Australia and adjacent countries. This ore is described as refractory—it cannot be treated in the ordinary furnace in the ordinary way. The writer has had some experience with it, and knows of endless trouble it has caused to English smelters in trying to reduce it to metal in their factories. One firm—the Runcorn Lead Smelting Co.—it ruined entirely, and their works were pulled down and sold. Still, the value of the ore and its great abundance in different countries has kept the chemist and metallurgist busy trying to solve the difficulty of easily and cheaply working it, so as to get the valuable metals out of it for the market. With this view fresh proposals in the form of patents appear at very short intervals, and have done so for the past fifteen years, till the sum total, I am told, in London amounts to over 400, involving the expenditure of many thousands of pounds. On perusing these specifications it becomes very clear that many of the inventors are not practical men in such industries, and what seems to be an easy thing in the laboratory proves altogether impracticable when tried in the works. In my next paper I propose to name some of the most noted specifications, and also to point out where they fail.

Doubtless this class of ore exists most abundantly of all other countries in Australia, and the Broken Hill mines have founded a most important industry on their large deposits. Other minerals exist there besides the class now being considered, as iron, copper, arsenic, kaolin, etc., but these are in the minority. Some of the ore which the writer has in his possession, and taken from bulk by himself, assayed:

|             |                  |
|-------------|------------------|
| Zinc.....   | 28%              |
| Lead.....   | 25%              |
| Silver..... | 34 ozs. per ton. |

Other samples I have taken of this mineral do not run so good, as, for instance, a sample of ore I met with in Swansea, Wales, assayed:

|             |                  |
|-------------|------------------|
| Zinc.....   | 23%              |
| Lead.....   | 18%              |
| Silver..... | 11 ozs. per ton. |

A parcel of like mineral I met with in London was assayed by a London firm of assayers, and they returned:

|              |                  |
|--------------|------------------|
| Lead.....    | 29%              |
| Zinc.....    | 18%              |
| Sulphur..... | 18%              |
| Silica.....  | 34%              |
| Silver.....  | 17 ozs. per ton. |

Other chemists who have examined the Broken Hill ore give an average of their work as a complete analysis:

|                |                 |
|----------------|-----------------|
| Lead.....      | 27.5%           |
| Manganese..... | 1.0%            |
| Sulphur.....   | 19.7%           |
| Zinc.....      | 23.0%           |
| Iron.....      | 7.5%            |
| Arsenic.....   | 0.4%            |
| Silica.....    | 20.0%           |
| Silver.....    | 8 ozs. per ton. |

A sample of similar mineral I had from the Mount Reid mines, in Tasmania, twelve months ago gave on my own assay:

|             |                   |
|-------------|-------------------|
| Lead.....   | 27%               |
| Zinc.....   | 33%               |
| Silver..... | 100 ozs. per ton. |

In Colorado some fifteen years ago the writer met with this zinciferous lead ore in many parts of the great Rockies, and an abundance of it is met with in Leadville. An assay representing a fair average of this mineral in that district was given by a local expert as:

|                    |                   |
|--------------------|-------------------|
| Zinc sulphide..... | 28%               |
| Iron.....          | 36%               |
| Galenite.....      | 16%               |
| Silica.....        | 20%               |
| Silver.....        | 12 ozs. per ton.  |
| Gold.....          | 0.05 oz. per ton. |

Readers will be struck with the great similarity of this mineral in countries so different and wide apart, and it may be very easily understood why so many and persistent efforts have been made in all directions to utilize so valuable a product of mother earth. At the Broken Hill mines they seem to have settled down to a system of dressing the ore by machinery, separating the argentiferous galena from the zinc-



blende, but this is at best only a partial success, for with the most careful attention and costly appliances the tailings contain a considerable proportion of the silver and lead contents of the ore they submit to this process. This dressing course seems to produce four qualities of material, viz.:

|                                                 | Pb. | Zn. | Ag.,<br>oz. per<br>ton. |
|-------------------------------------------------|-----|-----|-------------------------|
| Argentiferous galena concentrates assaying..... | 60% | 10% | 25-30                   |
| Middlings.....                                  | 15% | 25% | 10                      |
| Tailings.....                                   | 10% | 12% | 6                       |
| Slimes.....                                     | 30% | 20% | 20                      |

The rich concentrates come over to Europe and are sold to the smelters. An inferior concentrate they smelt themselves, while the middlings, etc., they stock in immense quantities for suitable treatment when such comes forward.

In Leadville, Colo., I am told, concentration is also followed of a similar nature to that in the Broken Hill district, and with a like loss in the tailings. These contain from 8% to 12% lead, and from 50% to 70% of the gold and silver in the ore is all that can be saved, while 20% to 40% of the lead is lost.

It may interest many of your readers to learn that the value of Broken Hill tailings on a good parcel that came under my notice only a few months ago, assaying

|             |                  |
|-------------|------------------|
| Lead .....  | 11%,             |
| Zinc.....   | 34%,             |
| Silver..... | 10 ozs. per ton, |

City of London or other convenient British port, was £2 10s per ton, spelter at the time being £18 per ton.

If we take the current price of the metallic contents of these middlings, we find that they total up to about £8 10s per ton, leaving, therefore, a working margin of about £6 per ton, if it be assumed that a total recovery of all the metals can be made, a thing scarcely possible in practice. Still, let me say that very wonderful things can be done with the very worst ore of the zinciferous tribe by a proper system of treatment and good working appliances.

(TO BE CONTINUED.)

#### Turbines Driving Mining Machinery.

The power employed to operate a large air compressor and generator in the power plant of the Boston & Montana Consolidated Copper & Silver Mining Co., Great Falls, Mont., is obtained from a plant consisting of two 54" McCormick turbines, herewith



illustrated, each mounted in a separate iron case, both discharging into one cast iron draft chest and plate steel draft tube. The outfit weighs 300,000 pounds, not including power connections, draft tubes nor the supply pipes. The manufacturers, the S. Morgan Smith Co., of York, Pa., say they are the heaviest pair of turbines built in America.

The wheels were tested at the Holyoke testing flume and developed 2800 H. P., under a head of 40 feet, with high efficiency at both full and part full gate. The speed is controlled by a Type "B" Lombard water-wheel governor. The gates are so accurately balanced that one man operates those of both wheels with ease.

THE Crown Mountain G. M. Co. of Dahlonega, Ga., preparing to work the ores of Crown mountain, near the courthouse at Dahlonega, has overcome the difficulty due to lack of water for sluicing by using electricity. Twelve miles distant is a good fall on the Chestatee river. Here an electric power plant has been erected. A pump station was placed on the bank of the Chestatee at the foot of Crown mountain and a 10-inch pipe line was laid to a reservoir at the summit, 1 mile distant and 560 feet higher. The reservoir has a capacity of 750,000 gallons. The triplex pump, driven by electricity transmitted by wire about 12 miles from the power plant, forces 1500 gallons of water per minute up and into the reservoir.

#### Method of Saving Fine Gold of Snake River, Idaho.

Written for the MINING AND SCIENTIFIC PRESS by  
WM. H. WASHBURN.

A commercial saving of the fine gold in the bars of Snake river was an unsolved problem for many years. Even a brief description of the various devices intended by the inventors to revolutionize gold mining, on that river at least, would fill a good-sized volume. As the mining of fine gold is yearly becoming of more importance, a brief description of some of the methods, out of which have been evolved the processes now most successfully used, may be of use to those engaged in mining fine gold under similar conditions elsewhere, even though on a small scale. For many years a modified form of rocker was most generally used, in which the sheet iron screen box was generally open at the back end, and the screen placed with a slight grade toward that end, so as to cause it to be self-discharging. The rocker was usually of ample size to allow room for the burlap and silver-plated copper plates, the latter being placed in the bottom of the rocker. We are told of the old-timer who once used amalgamated silver dollars as a substitute for the silvered plates, with good results. When amalgamated plates alone were used a portion of the gold (most of which appeared to be from the Boise river) would not amalgamate. Even a weak solution of cyanide, or nitric acid, seemed to have little effect upon it. The coating is said to be siliceous by those who have investigated it. For this reason the plates, when used, were generally preceded by burlap placed in the rocker in the usual way. Later, what is known as the beach machine found much favor, as it did not require motion.

The accompanying sketch (Fig. 1) will give an idea

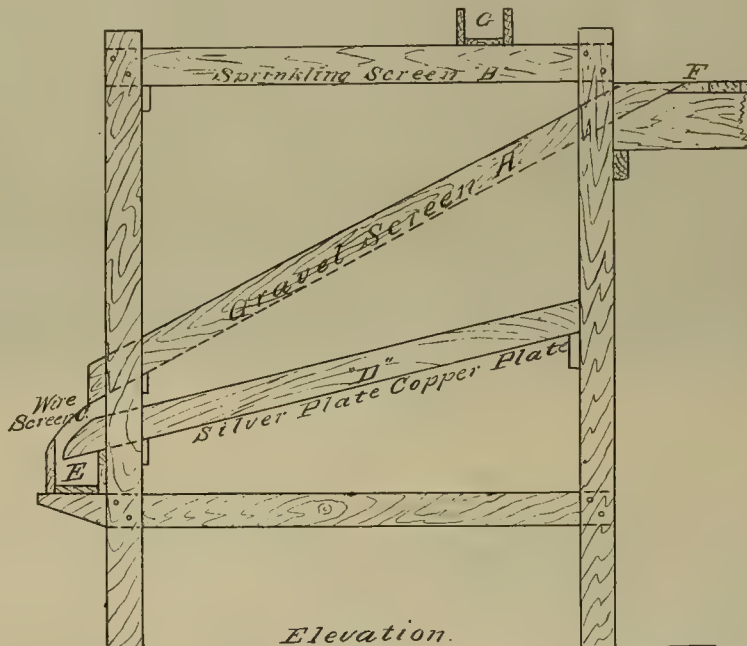


FIG. 1.

of its construction, in which A is a sheet iron screen, having about  $\frac{1}{4}$ -inch holes, not more than  $\frac{1}{2}$  inch apart. This screen is set on an angle of 25° or 30°, or just steep enough so that the gravel will slowly slide over it, only when water is applied. B is another screen, placed horizontally above it and having slightly larger holes, farther apart. This screen is for the purpose of sprinkling the water over the gravel as it slides over the screen A, which is supplemented by a narrow strip of wire screen C across its lower end, to allow the last trace of fine sand and gold to fall on the plate D or in the sluice below.

D is a silver-plated copper plate, from 3 to 4 feet wide, and set on an incline of about 3 inches per foot. The sluice E leads from the foot of the table to a sluice or a table from 2 to 4 feet wide, which is lined with burlap, or Brussels carpet, to catch the rusty or coated gold that escapes from the plate D.

The greater part of the gold, however, was caught on the plate, though it was often in very poor condition from the excessive use of cyanide solution, or other chemicals, the gold adhering only in places over its surface in many cases. The water supply was usually had from some convenient ditch, or was pumped from the river by horse power, and delivered to the machine through the sluice G. With small machines the water was sometimes delivered by hand, with long-handled dippers, or a small pump. In this case the gravel was placed in a hopper or inclined chute at the upper end of the screen. The gravel was fed from the chute by dashing water upon it as often as required. With the larger machines the gravel was usually conveyed to the machine by wheelbarrows, or by horse scrapers, and dumped on the platform F, and thence shoveled onto the screen

A, though in a few cases a more or less automatic feed was used.

The capacity of this machine was from 25 to 50 cubic yards per day of ten hours, according to its size and the industry of the operators.

Considering its simplicity and cheapness, it is quite an effective gold saver. In fact, much of the mining on a small scale on the river is now done by these or similar machines. Another device often used for work in a small way consists of a sluice from 6 to 12 inches wide (according to the water supply), the bottom of which is covered by canton flannel. Over this a stout wire screen of about  $\frac{1}{4}$ -inch mesh is snugly laid and held in place by cleats along the sides of the sluice. The wire screen protects the burlaps from the wear of the coarser gravel, and allows the black sand and gold to settle and be caught by them until they are loaded, when they are removed, washed in a tub or vat, and replaced for another run. This plan works very well, provided the sluice is cleaned up often enough to save most of the black sand, as when it begins to go over some gold goes with it.

The first dredgers were of the centrifugal pump type, intended to suck the gravel and gold from the bottom of the river. They proved to be not adapted to this class of work, the larger gravel and boulders accumulating around the suction nozzle so as to interfere with the continued elevation of the finer stuff and gold. The amount of sand and gravel raised was also too variable in quantity in relation to the volume of water to give good results in saving the gold; besides, the amount of fuel required and the wear of the gravel on the pumping machinery was excessive.

We know of but one dredger of this type that met with a measure of success, which was had by annually skimming the top layer off the gravel from the open bars under the most favorable conditions.

The owners of this dredger have recently invested in one of the bucket elevator type, however, as being better adapted to the work.

The so-called clam shell, or orange peel, single bucket type was tried and found wanting, most of the fine sand and gold escaping through the openings in the bucket, back again into the river. The bucket elevator type of dredger was successful from the start, both in excavating the gravel and saving the gold, although the latter feature has since been much improved. The continuous and even supply of gravel it furnishes to the sluices and tables is of great advantage to the gold saving department. Trommel screens were in one or two cases tried, but were discarded, and so far as we know are not now in use on the river. As there are but few boulders, the necessity for their use seems not as great as in some other localities.

The sand and gold were at first run over silver-plated copper plates, in one case, at least, having a side shake and grade of  $\frac{1}{4}$  inch to 1 foot. On these the coated gold would pass over with the tailings, so they were abandoned also.

What are known as the Caribou riffles were then tried, and gave fairly good results. These riffles were made of sheets of steel, having  $\frac{1}{4}$ -inch holes, about  $\frac{1}{2}$  inch apart, 2 feet wide by 4 feet long, and about  $\frac{1}{2}$  inch thick, placed crosswise in a sluice 4 feet wide and about 50 feet long. There were two of these sluices, one on either side of the dredger. A bottom of canton flannel and burlap was first laid down, as was above described, for the wire screen sluice. Then the Caribou riffles were laid down, beginning at the lower end of the sluice. The lower edge of each sheet or riffle was raised about  $1\frac{1}{2}$  inch from the bottom of the sluice, and overlapping the one below it about 2 inches, and soup to the upper end of the sluice.

They were supported by wedge-shaped cleats at-



tached to their under sides. They required from 1½ to 1½ inch per foot grade. The gold adhered to the burlap under the protected spaces beneath the riffles. The burlap and wire-screen sluice before described was tried in one sluice, with but little apparent difference in saving, both seeming to save the gold fairly well, and would probably work very well in any fine-gold placer work in a small way. Cocoa matting was tried, but proved too coarse for such fine gold.

When the burlap became loaded with black sand, it was necessary to clean up the sluices, and, as the dredger had to be stopped to do this, the separate burlap tables were substituted, as they could be cleaned up while running.

The burlap washings, or concentrates, were at first run over silver-plated copper plates, 4 feet wide. Both the stationary and shaking type of table were tried, the first having about 2 inches per foot of grade and the latter about ½ inch per foot. The stationary tables seemed to work best, although neither would save the coated gold above mentioned, even after treatment with diluted nitric acid; so the concentrates were placed in a wooden revolving barrel, about 4 feet in diameter and 5 feet long, with some rocks, sufficient to have a grinding action on the gold, which was thereby scoured, so that it readily amalgamated on stationary silvered plates.

The screening of the black sand and gold from the gravel seemed to be the most difficult part of the problem to solve, and, after various plans were tried, the one finally adopted was as follows: After removing the Caribou riffles and wire screens, the bottom of the sluices were lined with canvas, tacked down snugly in place.

Over this was placed a continuous perforated plate screen, b. This screen is about ½ inch from the bottom of the sluice at the upper end, gradually raising to 1½ inch from the bottom at the lower end, and is supplemented by a wire screen, with increased grade, to allow all the water to enter the distributing sluice. As the gravel passes down the sluice, the fine sand and gold are screened through to the space between the screen and the canvas-lined bottom. About 60% is saved on this canvas, which is usually only cleaned up about once in a week's run. This clean-up is made by first removing the screens, and, after sprinkling the bottom of the sluices with mercury, the gold and black sand are carefully washed down to the lower end of the sluice, where a box is placed to receive it.

The washing is done by a hose with moderate pressure and a whisk broom. The gold adheres quite closely to the canvas and cannot easily be removed without the use of the broom and hose combined. When the sluice is in operation the sand is drawn off at the lower end, into the distributing sluice c (Fig.

sand over the head of each burlap. The best results are had by covering the tables with canvas, which is in turn covered with thin burlap. The grade of the screening sluice is ½ inch, distributing sluice ¼ inch, and of the burlap tables 1½ inch to 1 foot, respectively. The burlap tables and the distributing sluice are suspended by hangers, so arranged as to allow them always to remain level, independent of any possible list of the dredger. There are two main sluices, each 4 feet wide and about 50 feet long, one on either side of the dredger, and it would probably be an improvement were these arranged on hangers also. For grinding the concentrates a shallow iron grinding pan was substituted for the revolving wooden barrel with satisfactory results. This pan is about 5 feet in diameter and about 6 inches deep. Above it is a vertical shaft, having four arms, to which are attached a number of stone drags, in the fashion of an arrastra, and iron scrapers. Some mercury is added after grinding a light charge of concentrates about twenty minutes, and the concentrates and mercury added gradually and continuously until the lot is run through.

The sand overflows into an annular trough around the pan, which grades toward a mercury trap at one side, and from thence over a silver-plated copper plate, which seldom shows much gold, unless the pan is being overloaded. In cleaning up, most of the amalgam is found in the bottom of the pan.

There are modifications of the above described process in use on the different dredgers, but the description shows the main features of the most successful methods now in use on Snake river.

We are indebted to S. H. Washburne for details of some of the later improvements in the process used. He informs us that in September, 1899, from a run of 104 hours, he cleaned up \$510.41, from a second run of thirty-eight hours \$300, from a third run of forty-five hours \$417, and from a fourth run of six hours about \$130.

The hours named represent the time actually spent in digging pay gravel. With coal at \$7.50 per ton, the cost of operating the dredger was 3 cents per cubic yard, not including the wear and tear of the machinery.

It is not to be supposed, however, that such results are to be had continuously, as much of the pay gravel is covered by a barren overlay, and the pay streaks seem to be limited in depth and area. Judging from the observed lay of the pay streaks, we are of the opinion that the largest and most continuous bodies of pay gravel are most likely to be found at or near points on the river where the course of the channel has been held within narrow limits by banks of rock for a number of years. Where the valley is wider there are many good streaks, but they occur in patches, distributed over a large extent of country.

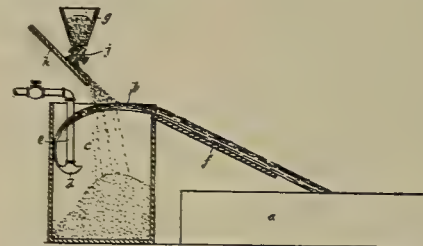
saved with it; third, that it is necessary to scour the gold in the concentrates by some form of grinding. With these principles carefully and intelligently carried out, there seems no reason why the percentage of gold saved should not be as high as 90, or even 95.

## Mining and Metallurgical Patents.

Patents Issued July 23, 1901.

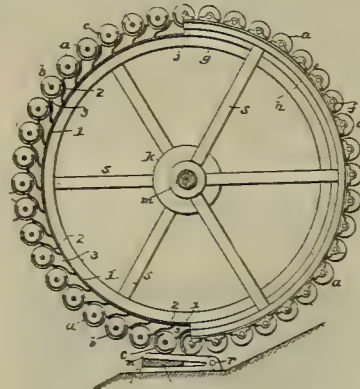
Specially Prepared for the MINING AND SCIENTIFIC PRESS.

APPARATUS FOR SEPARATING OR CONCENTRATING MINERALS OR ORES.—No. 678,860; H. P. H. Brumell, Buckingham, Canada.



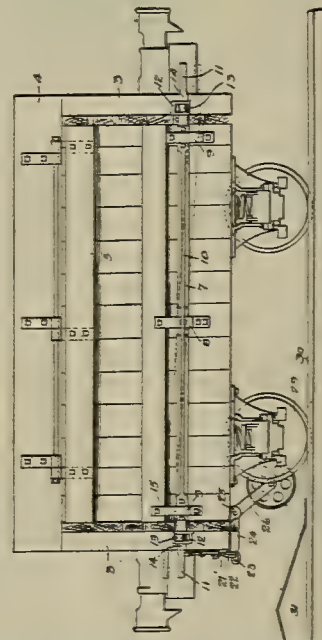
A vessel adapted to contain a body of still water, a water-supplying pipe projecting into tank below water level, pipe being provided with nozzle having discharge directed toward a point of end wall of vessel intermediate water level and level of nozzle, whereby a thin stream of water will be projected against wall and deflected across surface of body of water in vessel to a discharge at opposite end of vessel, and a hopper to deliver material to be separated to stream.

WATER WHEEL.—No. 678,869; G. Gocher, Johnstown, Pa.



A frame, a series of fixed buckets, a series of movable buckets mounted in front of fixed buckets so as to receive water therefrom as the wheel revolves, each movable bucket comprising end disks or rollers, shafts passing centrally through disks or rollers and revolvably mounted on frame so as to permit movable buckets to rotate freely and completely, and trippers disposed in paths of end disks or rollers for rotating latter and movable buckets when they reach the lowest point of movement.

ORE OR GRAVEL CAR.—No. 679,033; F. Peteler, Minneapolis, Minn.



A car having swinging doors opened by pressure of material in car, vertically operating means extending lengthwise of doors for locking them in closed position, and device automatically actuated

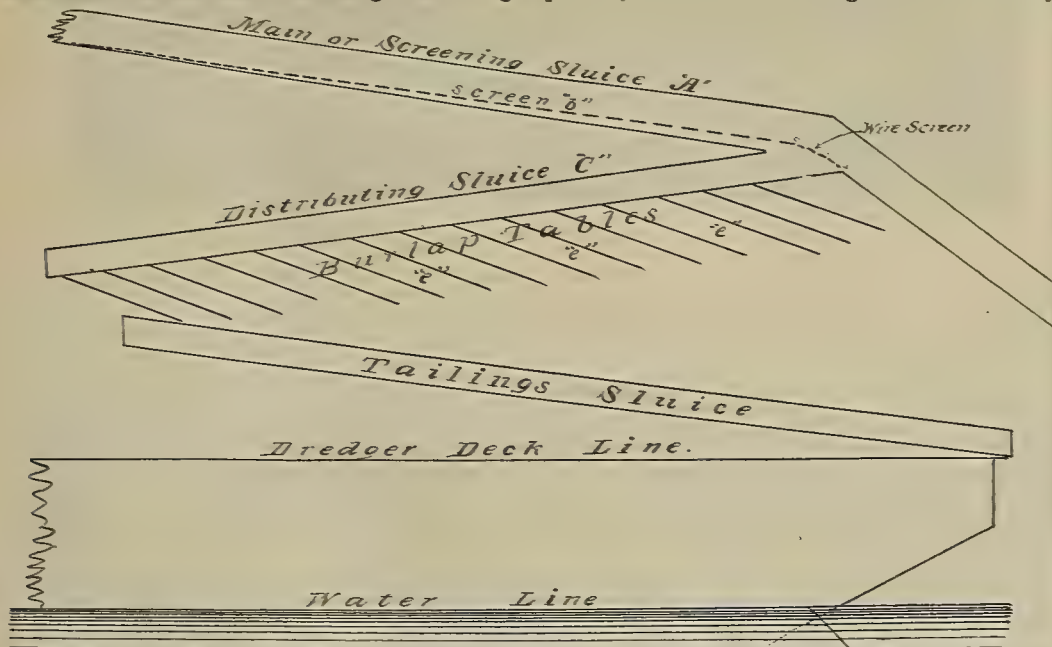


FIG. 2.

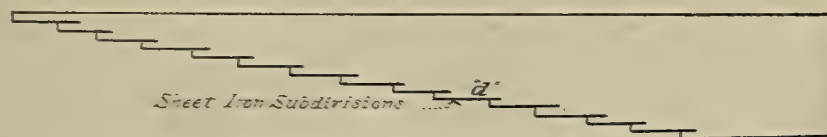


FIG. 3.

2), a vertical view of which is shown in Fig. 3. This sluice is gradually narrowed by fifteen sheet iron divisions along one side at d, each division supplying one of these burlap tables, shown at e-e (Fig. 2). These tables are 4 feet wide and 6 feet long, and are arranged on slides, so they can be removed sideways to change and wash the burlap. There are fifteen of these to each main sluice, or thirty in all, giving a surface area of 720 square feet.

A simple semi-circular spreader distributes the

In a general way, the dredgers on the upper river seem to have the most financial success. Probably being nearer the source of the gold is in their favor, as it would be in ordinary placer ground.

After observing the results of the various gold-saving methods in use on Snake river in the past and present, we may safely conclude: first, that the sand should be screened to as near the size of the coarsest particles of gold as possible; second, that to save all the gold the black or other heavy sand should be



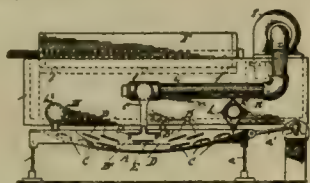
when car is moving in either direction to operate locking means and release doors.

**ORE WASHER.**—No. 679,100; C. F. Allen, San Francisco, Cal.



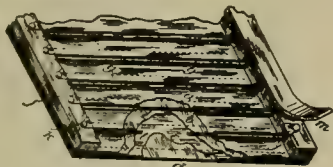
A sluice having sinks or riffles in its lower side, a magnetized plate in upper side of sluice, above sinks or riffles, and streamers adapted by current of water passing through sluice to cover magnetized plate and also mechanically prevent settling of magnetically attracted particles of ore on magnetic plate.

**CONCENTRATOR.**—No. 679,155; J. J. Montgomery, Santa Clara, Cal.



A vibrating table, having transverse slips above and removed from its bottom and immersed in water upon table, strips being set at an inclination to surface of table bottom, strips on opposite sides of a central portion of table having an opposite inclination and adapted to effect circulatory currents in water on table, whereby separated particles are moved to a central portion of table, a trough having feed chamber with delivery pipes to supply sand and water to table, suction pipes above central portion of table to which material has been directed by circulatory currents and adapted to withdraw lighter sand and water from table, a pump connected with pipes to effect suction, having a discharge into trough, exits from trough for sand and a communication in trough for permitting water therein to pass into feed chamber thereof, to be redelivered to table.

**BELT FOR ORE CONCENTRATOR.**—No. 679,248; F. W. Wood, San Francisco, Cal.



Side pieces, and a body or working surface composed of a plurality of plies of material, tucks formed in outer ply, rods inclosed by tucks, right-angular clips fitting inner corner of side pieces and each having an arm attached to one of rods, and another arm overlying face of side piece and secured thereto.

**Robins Belt Conveyors at British Columbia Copper Co.**

These cuts illustrate the use of belt conveyors built by the Robins Conveying Belt Co. at 15-21 Park Row, New York, at the sampling mill of the British Columbia Copper Co., just completed, at the Mother

Lode mine, Anaconda, B. C. Cut No. 1 gives a general view of the plant. Cut No. 2 shows the sorting conveyor in operation.

From the hoisting tower, seen at the back of the photograph, the ore passes over the grizzly bars, the fines dropping on to a 12" belt conveyor carrying them to the bins, while the coarse pieces are delivered to the crusher. A 36" sorting conveyor, 111 feet centers, receives the ore as it falls from the crusher and carries it to the bins. The waste, which is picked out by the men, as shown in Cut No. 2, is dropped into the chutes and falls onto a 12" belt conveyor, which carries it back and delivers it to the 16" waste conveyor, 540 feet centers, which can be seen in the left-hand portion of the photograph, running up the bank. The sorting at this mill is reported to cost 6 cents per ton. The Robins Conveying Belt Co. has just issued a largely illustrated book, descriptive of important plants recently installed, which will be mailed to any one applying for it.

### The Shanghai, China, Exchange.

China, with very few railway and telegraph lines, has fewer telephone lines or exchanges. The Ericsson Telephone Co. recently installed one of the first telephone switchboards at Shanghai, China.

translate the message into numbers, then telegraph the numbers, and finally where received translate the numbers back into Chinese characters.

The operation of the Ericsson full multiple switchboard is claimed by the manufacturers to be extremely simple, each section being divided into five panels for convenience, and in large boards an annex is placed at each end. The plugs and cords are placed on two different planes, the answering below and the calling above—an advantage to the operator, as the answering jacks are just above the answering plugs, thus separating them entirely from the calling plugs and multiple jacks. In case of a call, the operator answers and can connect directly from her own division with any other subscriber in the board, thus giving very quick service and saving the time of the calling subscriber and of the other operators. Each operator has eighteen pairs of cords and plugs, which provides for the busiest exchanges. As switchboards of this same pattern are already in operation in the United States, the Ericsson Co., 296 Broadway, New York, or their Pacific coast agents, the Electric Railway & Manufacturers' Supply Co., 68-72 First St., San Francisco, Cal., will take pleasure in giving further information to those who are interested.

MONGOLIA is the second great Province of the Chi-



Shanghai, China, Telephone Exchange.]

The illustration is of the first section, now in full operation. It is a full multiple board, made by L. M. Ericsson & Co., Stockholm, Sweden, designed for an ultimate capacity of 5000 subscribers. In the illustration it will be noted that, while the "chief" is a lady operator and was imported from Sweden with the switchboard, the others are all natives. It is said that they are remarkably apt in learning to operate, quick in their movements, and readily become expert operators. For service with the Chinese language the telephone is much superior to the telegraph. With the latter every Chinese character has a number, and in using the telegraph it is necessary to first

nese Empire to be opened up by the Russians. It lies directly west of Manchuria and is south of the Nertchinsk and Irkoutsk governments of Siberia. The Russians plan to build a railroad from Kiakta, on the boundary line of Mongolia and Siberia, directly across Mongolia to Peking. It will be a very short line, compared with either the Vladivostok or Port Arthur branches of the Transsiberian Railroad, and is, in fact, the natural line for the railroad from Europe to the Pacific ocean. It will open up a country of considerable mineral wealth, gold particularly, though less even is definitely known of it than of Manchuria.



General View of Plant of British Columbia Copper Co.



Robins Sorting Conveyor in Operation.



## MINING SUMMARY.

Specially compiled and reported for the  
MINING AND SCIENTIFIC PRESS.

### ALASKA.

#### KETCHIKAN.

Most of the prospects and mines on Prince of Wales island are so situated that wire tramways can be operated from them to tide water, where the largest ships can be safely loaded by gravity. The Copper Mountain, or Mellen & Reynolds property, is now operating a wire tramway 6000 feet in length, carrying the ore from an elevation of 3200 feet to the wharf at Copper Harbor.

The Alaska Industrial Co., a New York corporation, of which Senator Jones of Nevada, ex-Congressman S. W. Dorsey and Congressman Sulzer of New York are heavy stockholders, is employing forty men on its property at Copper Harbor. It has crosscut one ore body on its Jumbo claim, which shows 50 feet of chalcopryite ore that will assay about 6½% copper.

A Chicago company, on Skow Arm, has also a fine showing of copper. A 500-foot tunnel has been driven through hard rock and will cut the ledge at a depth of 400 feet on the vein, under a remarkable surface showing. G. McKenzie, Ketchikan, is Supt.

Copper Harbor, on the west coast of Prince of Wales island, the port of Copper Mountain, is rapidly becoming a mining camp. The Alaska Dev. S. Co. is working thirty-five men in the immediate vicinity of Copper Harbor, on development which shows improvement and is bringing pay ore into sight. On the summit of Copper Mountain, on the Mellen & Reynolds group, twenty men are working under supervision of Mr. Reynolds. Seven men are doing preliminary work on the Hetta Mountain group, in charge of W. T. Wright, and crews are also engaged on the Morrill & Houghton and Lowery & Woodbridge properties.

P. Clark, having bought the Iron Crown group at Tolstoi bay, Prince of Wales island, has begun to prospect them with a diamond drill, under the supervision of Mr. Butler. The Iron Crown shows an immense iron outcrop, carrying some gold and considerable copper pyrites. It is believed to be the capping of copper ore.

Allison, Baker & Wintermute have incorporated, capital \$200,000, to operate the Puyallup mine, on Kasaan peninsula, Prince of Wales island. The material for a 2-mile tramway from the mine to the beach has been bought and is being put in, so that the shipment of ore can be commenced.

The Mount Andrew M. Co., an English corporation, is operating the Mount Andrew group on Kasaan Peninsula, Prince of Wales island, on a large scale, doing development work. The ore is chalcopryite associated with magnetic iron. A. P. Swineford of Ketchikan is superintending the development of a copper proposition for himself and an Ohio company at Niblick Anchorage, Prince of Wales island.

### ARIZONA.

#### COCONINO COUNTY.

R. Baumgarth states that two companies are operating at Coconino now. The Petoskey, R. Lyon Supt., is the smaller and has ten claims. It has a leaching plant under continuous operation and several more tanks are to be put in at once. The special process employed is known as the Dean process and consists of breaking and crushing the ore to 20-30 mesh fineness, adding chemicals and getting the metal into solution. The solution is then run over scrap iron and the cement copper precipitated. The company gets water from the Warm springs on the Kanab side of the Buckskin mountains, pumping it about 500 feet high through ½ miles of pipe. The Coconino Co. owns forty claims at Coconino. It has a gravity water system supplied through a 7-mile pipeline. General Manager A. Nebeker is building a 100-ton leacher. The O'Neil process of leaching will be used there, and will reduce the copper to a 50% precipitate, which will then be smelted in the smelter which the company has already erected, after which its output will be shipped by team to Marysvale.

#### GILA COUNTY.

W. H. Case says the Fortuna mine shaft is down 1200 feet. On the 900-foot level a 12-foot body of free milling gold rock is being mined, and from the bottom of the working shaft a drift is being run to cut the ore body 300 feet lower. The mine is owned by C. D. Lane of San Francisco, Cal.

#### GRAHAM COUNTY.

G. P. Andrews, manager of the Pinal Copper Co., says work is progressing on

the Black Copper mine. The ore bodies look well and the mine is making a fair output of shipping ore.

#### PINAL COUNTY.

The final payments have been made by the Manhattan C. M. Co. for the Sutherland mines near Troy. C. H. Cutting, manager of the Troy Copper Co., is also manager of the Manhattan mines.

#### YAVAPAI COUNTY.

W. H. Wilson of Congress Junction has sold his option on the old Bullard mines to R. E. Fowler of Salt Lake City, Utah, acting, it is said, for New York people. The mines are near the Congress mine and carry copper and gold.

Work at the Verde King group is being pushed and good ore is being developed. J. Pella has a contract for sinking the shaft and B. Townsend a contract for running a new tunnel 200 feet. The Verde King group of twenty claims at Jerome is south of the United Verde.

A ledge has been discovered at Prescott said to be over 100 feet wide. G. H. Schuerman, G. Henry, T. Houlihan, J. Sparks, J. Turnbull and F. G. Plummer have located four claims and are prospecting it.

#### CALIFORNIA.

The State Mining Bureau has prepared complete maps of the copper-bearing section of Shasta county. The assistants to State Mineralogist Aubrey have largely completed the field work for the Bulletin to be issued on copper production in California. Prof. F. M. Anderson is still in Shasta county and J. H. Tibbits is in Sonoma.

#### AMADOR COUNTY.

The rebuilding and addition to the mill of the Keystone mine is completed.

#### BUTTE COUNTY.

New machinery is to be put in the Golden Trout mill at Lumpkin and other improvements made. Pending the construction a reduced number of men are working.

#### CALAVERAS COUNTY.

The Maxwell hydraulic mine on San Antonio ridge, conducted by E. C. Rigney, has cleaned up \$2000 for the last 40-day run and a total for the season of \$5000.

It is reported that operations at the Commodore mine, near San Andreas, will be commenced in a short time. Machinery will be installed at once and the shaft will be put down to a depth of 800 feet before crosscutting.

The company operating the Bovee mine, at Angels, are sinking a shaft on the Fritz mine, the north extension of the Bovee.

At the California-Ophir mine at Carsons the mill will soon be ready to start up. Electric power will be used for operating the mill and compressed air at the hoist.

G. W. Bowser of Whisky Slide, in the Mokelumne Hill district, says he has arranged to bond the Kenross mine and other claims to New York City people for four years, the property to be developed and partial payments made meanwhile.

A 30-day option on the Harmon copper property, at Campo Seco, is reported to have been granted at a high figure. The Campo Seco copper mines are being worked and said to be paying well.

The Golden Gate mine, at Angels, is to be developed by Stockton people, who say they expect to expend several thousand dollars in exploratory work.

The Lone Star gold mine, near West Point, after being closed down for a considerable time has resumed operations.

#### EL DORADO COUNTY.

The Starlight mine at El Dorado is running steadily.

Supt. Harpinding of the Church-Union mine has installed a new water hoist and is about to pump out an old 1600-foot shaft, to work the mine through it in the future.

J. C. Heald of Nashville has bonded six claims to New York people, who intend to develop them and have started work. It is intended to drive in a 700-foot tunnel.

Sinking on the Montezuma mine, at Nashville, has been resumed, and machinery, including electric drills, will be put in. J. C. Heald is superintendent.

The Rosebud mine, near Fairplay, has been sold, and extensive work begun by the new management. M. L. Smith, the former owner, is superintendent.

#### KERN COUNTY.

The Good Hope-Kinyon mine, at Randsburg, has been bought by people represented by W. J. Trask for, it is understood, about \$10,000. The 2-stamp mill, three dwelling houses at the mine and other property go with the mine.

#### MONO COUNTY.

The mill machinery of the Sweetwater Co. at Bodie is being installed. A cyanide plant has been ordered for immediate construction.

#### PLACER COUNTY.

Supt. H. M. Jarvis of the Bob Lewis No.

2 gravel mine, near Red Point, states that the new bedrock tunnel running to tap the channel is now in 200 feet. An air compressor and power drills are used. It is expected the channel will be reached in about 1200 feet.

The Jupiter Con. G. M. Co., operating a drift gold mine at Iowa Hill, has declared its first dividend.

#### SAN DIEGO COUNTY.

A Los Angeles company, headed by E. L. Baker, has bonded the Hodges mine on the Colorado river, opposite Cibola, Ariz., and are opening up large bodies of high-grade gold ore. The purchase price is said to be \$75,000, to be paid in installments as the mine is developed.

#### SHASTA COUNTY.

The company, including Senator J. P. Jones, which has bonded at \$45,000 the Kline & Wall copper claims in the Bully Hill district, will soon begin work on the property. J. M. Day of San Francisco, representing the bondholders, will be in charge.

P. Anderson has bought from C. E. Kircher a third interest in the Kennett mine; from D. Endicott a third interest in the Copper King and Copper Queen, and from Mrs. C. E. Kircher a one-third interest in the Lime Mountain claim. All are in Backbone district. Anderson is foreman at the Shasta King mine of the Trinity Copper Co.

Boswell & Johnson are shipping ore from their mine at Shasta. They are down about 50 feet and are drifting to the ledge.

A. M. Brewer reports that at the Mt. Shasta, at Stella, a ledge of rich ore is showing in the bottom of the shaft.

McFall & Hunting have struck a rich shoot in their mine near the Mt. Shasta, at Stella.

#### SIERRA COUNTY.

The Pride hydraulic mine on Deer creek has completed the season's run and cleaned up \$9000. The mine is owned by B. Pride, A. Pride, B. Babb, N. B. Willets and others.

The Fir Cap mine, near Downieville, is installing air pipe preparatory to beginning work in the face of the tunnel. J. Erwin is foreman.

H. Kingdon and others of Poverty Hill have bonded the Poverty Hill hydraulic mine to A. Winter and associates of New York City.

#### SISKIYOU COUNTY.

A pack train is taking ore from the Jim Budd quartz claim on White gulch, near Sawyer's Bar, owned by Hickey Bros. They will make a crushing at the Jumbo mill of about thirty tons of ore, that is said will go about \$50 a ton.

A rich vein of ore was uncovered recently by Clement, Downing & Son, near Pack Saddle camp, on Blue Ridge, near Sawyer's Bar. It is said to be a blanket ledge and to prospect \$40 a ton.

The new 300-foot tunnel being run at the Las Parias mine, on the South Fork of Salmon, is completed and has opened up a vein of ore from 14 to 20 feet in width. Their assays go from \$10 to \$30 to the ton. O. Herschey, Forks of Salmon, is Supt.

#### TRINITY COUNTY.

Work on the Sweepstake pipe line is being pushed rapidly. The S. F. Construction Co. is making good headway in excavating the trench for the pipes, and the pipe men have started making the pipe. At the mine the ground is being cleared for a reservoir.

#### TUOLUMNE COUNTY.

The Tuolumne Power & Dev. Co. has been incorporated with principal office at East Orange, N. J., and branch office San Francisco, to make a water power development from the main Tuolumne river at Jacksonville. C. F. Linder, of Jacksonville, is president, B. S. Tyler, of San Francisco, secretary.

Twenty men are employed at the Mack mine, at Big Oak Flat. Sinking of the new shaft is being pushed, and the old works are being put in shape for working. It is the purpose now to put twenty stamps in the mill at the start.

The Mary Ellen mine, on Tuolumne river, near the Mohican M. Co.'s mines, has been bonded to Los Angeles parties for \$15,000—\$500 cash paid down. It is said a mill will be erected at once.

A. M. Williams, the Supt. of the Felicitana, near Jacksonville, with R. S. Enslow, is opening up the Badger mine, near Jamestown. G. E. Stayton is Supt. for them.

J. M. Meighan is reported to have bonded the Mt. Jefferson mine and will resume its operation at once. The shaft is to be sunk 300 feet deeper, levels run and the mill started up.

A strike of free-gold ore has been made on the Wilkinsons claim, on the Tuolumne river. The vein runs easterly and westerly and is very strong.

#### YUBA COUNTY.

The work of prospecting on the O'Brien tract at Newbert has so far advanced that

a sale of the land for dredger mining is considered assured. J. E. Doolittle, one of the prospective buyers, is on the ground. The price agreed upon for the land is said to be \$70 an acre.

### COLORADO.

#### BOULDER COUNTY.

A streak of ore going eight ounces gold per ton has been struck in the 70-foot level of the Red Lion mine at Bloomerville.

#### CHAFFEE COUNTY.

The ground has been graded for the reduction works at Garfield.—A few men are at work in the Eclipse mine preparing for ore production when the plant is ready to operate.

The Stockton, at Cleora, is now having an air upraise made from the tunnel. As soon as completed the tunnel will be advanced 300 feet farther, to thoroughly prospect the ground.

Kennedy & Spellman of New York City have taken an option on the Sir Thomas Lipton claim, near Buena Vista. It is the intention to secure the claims on Mount Carmel and develop the mountain by driving a tunnel.

#### CLEAR CREEK COUNTY.

C. K. Wolfe of Georgetown has taken a three years' lease on the Kirtley group and will begin operations at once. The Kirtley has been idle for several years.

#### CUSTER COUNTY.

The Hard Times M. Co. has been incorporated by C. Rhodes of Chicago, Ill., and J. A. Park and J. H. McCorkle of Pueblo, capital \$10,000, to mine at Silver Cliff.

#### DOLORES COUNTY.

The Rico M. & M. Co., operating the Atlantic Cable mines, is adding to its milling plant at Rico and the mill capacity is now doubled; further additions are under consideration.

#### GILPIN COUNTY.

The Hampton mine, in Russell district, near Blackhawk, is shipping concentrates returning \$38.60 to \$72 a ton. The vein is 42 inches wide and the ore concentrates 3 or 4 to 1. N. C. Hughes is manager.

The Stewart G. M. Co. has been incorporated, capital \$1,000,000, Portland, Me., being the principal office. The incorporators are G. A. Purbeck, N. J. Wheeler, W. H. Bowen, J. E. Blakemore, C. A. Clark, E. A. J. Foote and H. L. Crane, with J. Gilmore of Central City as resident agent. It proposes to operate the Stewart mining properties in Hawkeye district, near Central City.

The Ophir mine, at Nevada, has increased its working force. The average product of milling ore runs from fifteen to twenty tons per day, the smelting product being from ten tons and up per month. This property is owned locally. A. Waters is superintendent.

H. J. Sevis and associates have leased a portion of the Bobtail lode, at Black Hawk, from L. H. Stockbridge, manager of the Boston & Denver Con. M. & M. Co.

The Mascot group, in Pine Creek district, near Central City, has resumed operations after a two years' shut down. The property is to be operated by the Boston Occident G. M. & M. Co., in which Massachusetts people are interested. R. Brown has been appointed foreman in charge.

Denver people are planning to start up the C. P. W. mine at Black Hawk.

Rose M. Benoit has sold to the Palace M. & M. Co., for \$10,000, the Palace, Pied Piper, Two-Fifty, Highlander and Poor Man claims, in the Silver Lake district. It is reported that work is to be started on the group at once.

The Edna G. M. & M. Co. has been incorporated, capital \$50,000, by F. P. Miles, Ida Smith and A. H. Smith, to operate the Consumption property in Como Lake district, near Central City. The property has been opened up by a tunnel. Ore carrying a high percentage of lead has been taken out.

E. J. Channing has given to the Little Kingdom M. Co. a two years' lease and option, at \$8000, on the Etta, Maggie, Chafey, Make and Mary lodes, in Pleasant Valley district, near Central City.

#### HINSDALE COUNTY.

The strike reported in the Henson creek lead mines group at Lake City is said to be proving better as development extends in it. Besides a streak of shipping ore, there are 4 feet of milling ore in the breast. The power plant being built by the company is being pushed to completion to provide air for power drills.

#### LAKE COUNTY.

The South Winnie Leasing Co. of Leadville, operating on a lease, has paid its second dividend of \$5000 within four months. They are taking out ten tons daily of \$30 ore and occasional lots which assays as high as thirty ounces silver, twenty-one ounces gold and 30% lead. The owners are very confident that they have the making of a



big mine out of their lease. It embraces five acres for a term of years.

The lessees on the Blonger, on Fryer hill, at Leadville, have good indications for a regular shipping property. In driving for air they struck a good iron body which pays to ship and which is improving.

The Highland Mary mine, at Leadville, is being reopened by lessees. It is expected that the same ore body found in the Gallagher (adjacent) will be opened up, and shipments will be made from the old dump, which contains good silver values.

Denver people are interested in a five-year lease on a twenty-acre tract on Little Ellen hill, Leadville. The new company is known as the Forest City L. & M. Co. and has been incorporated by G. S. Codrey, E. B. Coe, A. W. Patton, F. C. Goudy, C. Field, M. B. Carpenter and J. Lindsey. They expect to open up the same ore body which the Resurrection and New Monarch companies have.

The lessees of the Louise claim, at Leadville, have found a vein of good grade oxidized ore lying on the quartzite, and are now developing it. The ore is from 3 to 4 feet wide and will average 0.2 of an ounce of gold, 30 ounces silver and 30% lead.

#### SAGUACHE COUNTY.

S. D. Bullington of Florence has been inspecting the mines owned by P. R. Harpel, B. W. Mencer and other Iowa people. He says there are eight claims near Villa Grove with 500 tons of copper ore already on the dump, assaying from \$15 to \$50 per ton, copper predominating, but some lead, silver and gold. It is probable that a 20-ton smelter will be erected at the mine this year.

#### TELLER COUNTY.

The Gold Ex. T. Co. has begun on its second mile from the Cripple Creek end of the tunnel over to the Victor mine. The heading of the tunnel is now advanced 6000 feet and operations are being carried on in the Little Clara claim. The tunnel, as at first projected, is now about half completed and is every day believed to be getting closer to rich ground.

Bad air is being generally complained of in many of the mines of Cripple Creek district, and several companies are experimenting with methods of air purification. Chemicals have not proven effective in ridding the mines of poisonous gases. Fans and blowers so far as used have not produced desired results, and now the mining engineers of note are being asked for advice concerning the problem.

The Twin Sisters M. & M. Co. has leased to J. Wood and J. Connors the company's Raven hill ground at Cripple Creek for thirty months. It stipulates fifty-two shifts a month, a new 200-foot shaft and 20% flat royalties.

The co-operative drainage plan outlined by the three largest companies on Raven hill, at Cripple Creek, has been received favorably. The idea is to run a tunnel that will cut the Elkton a little below its present depth and continue it through the hill to connect with the Doctor-Jack Pot and Mary McKinney. The cost would be a great deal less than the three companies could save in pumping.

The shaft on the Blue Bell is completed to the 250-foot level and the lessee—G. Kurt—has resumed work. In the 180-foot level considerable development work is being done and ore is being saved.

The Solitaire Co., operating the Columbia claim at Cripple Creek, has struck the same ore shoot at the 400-foot level which was opened in the 340-foot level.

#### IDAHO.

##### BLAINE COUNTY.

H. L. Childs is operating on the South Boise, 28 miles from Soldier, for a New York company owning 660 acres of placer ground along the river. He states that prospecting with drills the results are satisfactory and a dredger will be bought and installed next season. Tests show the ground carries 40 cents a cubic yard in coarse gold. An Ohio company has bought a large tract of ground adjacent and will work it, using a dredger. The company is represented by C. W. Purcell.

##### IDAHO COUNTY.

A strike is reported on the Blue Dragon lead, in the Elk district, a 5-foot seam of ore assaying \$49 per ton having been developed on the 100-foot level. The mine is owned by the Alamance Co. of San Francisco, which has built a new mill on the property.

The Rhett Creek M. & M. Co. has been incorporated by F. Hye, J. Pierson, W. Hye and L. Hye, all of Spokane, Wash., with capital of \$1,000,000. A branch office will be at Dixie, Idaho, where the mines of the company are located.

W. Mack of Spokane, Supt., has started work on the Sixty-four quartz claim at Dixie, owned by W. J. C. Wakefield and T. Garrison of Spokane, R. Dennsler of Greenwood, J. Morris of Rossland and others. The ledge has a pay streak of

18 inches that averages over \$50 per ton in free milling gold.

#### KOOTENAI COUNTY.

J. P. Salzer, general manager of the Gold Coin Co.'s gold mine at Black lake, has made arrangements for the construction of a cyanide plant for the ore treatment, and expects to have the mill in operation before winter.

At the Keep Cool mine, Lake Pend d'Oreille, near Lakeview, the face of No. 5 tunnel is in solid ore. Three tons of ore have been shipped to determine the best process of treating the ore preparatory to installing a plant. The values are in lead and silver.

#### LEMHI COUNTY.

The Mormon Boy group, near Salmon City, owned by the Messrs. Goss of Salt Lake City, Utah, is reported by L. Gilson, who recently examined it, to have no less than 6 feet of free milling ore, averaging \$12 per ton. There is a small mill on the property.

#### SHOSHONE COUNTY.

Clark & Sweeney and the Empire State Idaho M. & Dev. Co. have been sued by W. C. Murphy of Missoula, Mont., who alleges that he was deceived by the defendant into selling his one-eighth interest in the Skookum claim in the Cœur d'Alene district for \$2000 when it was worth hundreds of thousands of dollars.

The Bitter Root Mountain M. Co. is running a tunnel to the ledge in its mine on Placer creek, near Wallace. The company is a Spokane corporation. E. B. Van Osdel is president and F. A. Edgerton secretary.

#### MONTANA.

##### DEER LODGE COUNTY.

F. Cannon is developing a mine near Lincoln which shows a vein 7 feet wide carrying free milling gold.

##### FERGUS COUNTY.

The Great Northern M. & Dev. Co., at Gilt Edge, is prospecting on its various properties in addition to keeping its mill running steadily with an average monthly production of about \$33,000. On the Stand By group, west of the Chickadee, a great deal of ore has been exposed on the surface. On the Cuba lode of the Gilt Edge group, a tunnel has been driven 500 feet to cut a body of ore exposed in a shaft on the hill above. On the Homestake a shaft has been sunk 65 feet, which shows ore suitable for cyanide treatment for its entire depth.

##### LEWIS AND CLARKE COUNTY.

The Buckeye mine and mill at the head of Basin creek has been bought by C. J. Davis and W. Judson of Lansing, Mich. W. Thompson is superintendent. The price is said to have been about \$50,000, some paid down. A new shaft will be sunk. There is a 35-ton concentrator on the mine.

T. E. Collins, J. L. Main and associates are forming a company to operate the cyanide process in Montana. A contract to treat the tailings and ore of the Empire mine has been made and a 500-ton plant is being built at that mine. They are building a similar plant at the Prize mine on Granite Butte.

C. M. Sheldon, operating the Howard mine at Helena, says the mine has enough second-class, free-milling ore opened up in the stopes and on the dump to run a 10-stamp mill for a year, and, in addition, a large quantity of high-grade shipping ore in the new stopes.

J. McIrvin has leased and bonded the Aetna, near Elliston, to J. D. Walcott & Co. of Colorado. The mine has a shaft 150 feet deep, equipped with a whim. The last shipment of ore is reported to have yielded \$210 per ton in gold.

T. Fitzgerald, representing St. Louis people, is developing a group consisting of sixteen claims, near Helena, by surface cuts and shafts. The surface indications are considered promising.

The Hamilton Co. of Cleveland, Ohio, which is developing the Yellow Jacket mine at Helena, has its shaft down 100 feet and is preparing to erect a steam hoist. The ore is said to average about \$8 in gold. It is intended to erect a cyanide plant to treat it.

##### MADISON COUNTY.

W. B. Millard of Nebraska has taken an eighteen months' lease and bond on the Kearsarge mine, at Summit, and has begun work on the property.

Major Isdell is working the Whippoorwill, a claim owned by himself and M. Green, on Mineral hill, at Pony. The claim is developed by a 60-foot shaft in ore that it is claimed goes about \$50 a ton.

##### MISSOULA COUNTY.

(Special Correspondence).—The Deer Creek G. M. & M. Co. at De Borgia is a close corporation of Philadelphia and New York people, capital \$10,000,000. They are engaged in fitting up their placer mines for operation. The claims comprise about 7 miles of gulch dig-

gings. The installed plant consists of an elevator with two giants. Water brought through a 3-mile flume is used under 400 feet head. The company also own and are prospecting a number of adjacent free milling gold-bearing quartz ledges in quartzite formation. In the rock formation quartzite instead of slate resides the principal geological difference from the Cœur d'Alene country, which includes the western slope of the Bitter Root range, De Borgia being on the eastern slope. The slates carry silver-lead ore deposits, the quartzite free gold and an inconsequential amount of sulphides.

De Borgia, July 20.

#### PARK COUNTY.

The Mammoth tunnel in the Gilt Edge district is now in 150 feet. The time for the option of \$100,000, held by W. L. Lawrey for New York people, has been extended until the tunnel can be driven 100 feet farther, when it is expected that the ore bodies exposed on the hill above will have been reached.

#### SILVER BOW COUNTY.

(Special Correspondence).—The mine of the Speculator M. Co., at Butte, is situated in the vicinity of the Modoc, High Ore and Bell, on the slope of the hill facing Meaderville. The property is on one of the east and west ore ledges and is opened through a 1200-foot vertical shaft that sinks about 100 to 150 feet north of the ore body. From each 100-foot station a crosscut runs southward to the ore ledge. A large amount of drifting has been done on each level from the surface down to the 1200, and ore is stope out to considerable extent from the various upper levels. The twelfth level stopes run ten sets high at a point opposite the shaft, with the work proceeding eastward. The timbering is in square sets of the heaviest character. From each shipping level two chutes are built upward to the various stopping floors; one chute receives the smelting ore and the other the ore intended for milling. Thus the ore is sorted in the stopes into the two grades. The ore ledge ranges from 5 to 40 feet wide and is next to granite walls. The ore at the 1200 level carries a considerable amount of iron in some places. Some 300 to 400 tons daily are being hoisted. On the surface is a brick shaft-house, with good hoisting facilities, having air compressor and heavy boilers and a steel self-supporting smokestack. The work is under the management of W. W. Wishon, with P. Sheehan as foreman.

Butte, July 27.

A 5-foot vein of copper ore has been struck 490 feet down on the Sinbad claim, at Butte. The property is being worked by the Largey estate and M. Genzberger, the latter being manager.

#### NEVADA.

##### EUREKA COUNTY.

The \$30,000 option on which W. D. Thompson and A. K. Tiernan have been operating the Bay State mine, at Eureka, has been bought by R. Evans of Salt Lake City, Utah.

##### LANDER COUNTY.

Plans for the proposed 40-stamp mill for the New Pass mines, recently bought by W. F. Synder and his associates of Salt Lake City, are completed, and bids for construction will be soon asked for. The management desires to build the plant this year and begin the working of nearly 30,000 tons, said to be in sight.

##### LYON COUNTY.

The Lagerbeer mine, near Silver City, formerly included in the old Succor ground, is claimed to have produced over \$35,000 in gold bullion in the last six months, and is still producing ore.

##### NYE COUNTY.

The shaft on the lease of Burgess, Argus, Spenker, Livesley, Sunderland and Knapp, known as the "Never Sweat" lease, situated at the base of Oddie mountain, Tonapah, and the highest workings up on the mountain, is down 120 feet and has struck the ledge, the rock assaying \$240 per ton.

##### WASHOE COUNTY.

The California & Nevada C. M. & S. Co., J. Niebuhr Sec., at Reno, is working a group of claims on Peavine mountain, and, it is said, intends shortly to put up a smelter for its own and custom use.

##### WHITE PINE COUNTY.

L. Smith of Elmira, N. Y., and A. C. Barton of Murfreesboro, N. C., are in Ely to examine the properties of the Canton Co. in the interest of people who have subscribed for stock in the company now being formed for their development.

Suit has been commenced in the U. S. Court, Carson City, by Mrs. Ida McKinley and Mrs. Mary B. Barber against J. Steele, W. Hayes and others to recover possession of the Elijah mine, one of the patented claims of the Can-

ton M. Co., which it is alleged the defendants are operating, and also for \$10,000 damages, for the ore taken out by the defendants. Mr. Steele is the owner of the Macon City mine adjoining the Elijah, and denies that he has at any time extracted ore from the patented claim, all his workings being well within his own lines.

#### NEW MEXICO.

##### COLFAX COUNTY.

A. B. Gray, A. F. Griffith and others of Denver, Colo., have incorporated the Empress Free Gold M. & M. Co., capital \$1,500,000, to operate in Colfax county, New Mexico.

##### EDDY COUNTY.

W. C. McDonald and I. Bolles of Carlsbad, prospecting in the Guadalupe mountains, have discovered a large body of copper ore of high grade. They state that there are at least 100 carloads of the ore in sight in float.

##### SANTA FE COUNTY.

The Jones copper mines in the Maluchet district, near Santa Fe, have been bought by A. R. Gibson. He expects to begin work on the property at once. The ore body is said to be 12 feet wide, carrying 9% to 20% copper and \$12 gold a ton.

#### OREGON.

##### GRANT COUNTY.

(Special Correspondence).—The Belcher property is situated  $\frac{1}{4}$  miles south of Alamo, near the head of Olive creek. This was purchased by G. W. Daines of Illinois through W. H. Jackson, the latter being now in charge of developments. Two tunnels have been started, the lower having been driven 650 feet on the strike of one of the known ledges. The ores are similar to those already described in the Alamo district. Mr. Jackson is erecting buildings and is considering the matter of putting up a stamp mill.

The Strasburg is on the eastern slope of Quebec mountain. It belongs to W. H. Remington of Tacoma and Francis Clarino of Portland, with others. There appear to be three ledges here, which have been cut by a crosscut tunnel.

Among the newer properties in this district the Concord group, belonging to the Concord G. M. Co., is one of the best developed. It sidelines with the Red Boy group on the west, covering a ledge that runs parallel with those of the latter and a fraction that carries the southern portion of the Red Boy's Blaine vein. The parallel ledges on the two groups run north and south, through a belt of slate, which is bounded by a granite formation about 1 mile toward the west. A porphyry dike cuts diagonally through the two groups from northwest to southeast, and where it cuts through the ledges of ore the latter are slightly displaced.

The Concord is opened through a main tunnel that starts at a point 100 feet higher than the main tunnel on the Red Boy group. This tunnel goes 195 feet through barren ground, thence 400 feet northward on the vein, to where the latter is displaced by the porphyry dike. Cutting through the latter, the vein is again picked up by a crosscut 75 feet to the west. The main tunnel is continued on diagonally to this vein, on which the drift is carried 180 feet. At a point 90 feet north of the porphyry dike a crosscut runs eastward 200 feet to the Blaine vein, the drift thereon being carried 330 feet northerly toward the Red Boy workings. This Blaine vein is about 5 feet wide and carries high-grade ore. The main Concord vein, described above, is 25 feet wide in some places. The work on the group aggregates about 2000 feet. The vein material is a quartz, altered slate and porphyry, all more or less mineralized. At the water level, below the tunnel, the ores become more of a sulphide than those above. The tunnel work, when pushed farther on, will cut the apex of the hill at 500 feet depth. W. W. Robbins, general manager, C. B. Wade, J. H. Robbins, J. A. Howard and C. C. Robbins are trustees.

Granite, July 20.

(Special Correspondence).—The Red Boy mine and its underground workings have been previously described in these columns. It is a property that long has taken rank as one of the best producers in eastern Oregon. Since my former visit here the veins have been more thoroughly opened and many surface improvements are noted. A three-compartment shaft, now at a depth of 200 feet, is sinking at a point 50 feet above the main tunnel. An excellent shaft house, with heavy gallow-frame, has been erected; it includes hoist, compressor and boiler rooms. The hoisting engine has double reel and is capable of operating to 2500 feet depth. The compressor is of the Reidler type and is the right-hand side of a duplex. The four boilers are capable of 180 H. P. each. A pump is set at the 200-foot station in the shaft. When the shaft reaches 200 feet



below the main tunnel level a crosscut will be driven 300 to 400 feet to the vein, which will enable them to stoop on the ore body up to the old workings. From a point in the old workings a crosscut is being driven from the Red Boy vein westward to the Blain vein. It has progressed about 1400 feet, and they expect to cut the latter vein at about 100 feet farther. There are already extensive drifts on the Monarch and Red Boy veins. Plans have been made to pipe water from Olive lake, west of the mine, to a point near the mill, which will give 1100 feet pressure. The power will be used for electric generation. This will supplement the present water power system by which the mill is operated. The Red Boy is the property of Godfrey & Taber.

The Little Giant, of which Chas. E. Balmforth is manager and S. G. Williams Supt., belongs to a Liverpool corporation. It is located near the head of Spring creek, which flows toward Clear creek. The property is provided with a number of buildings and a 20-stamp mill, with the machinery on the ground, but not set up. A tunnel has been driven about 1450 feet, in the course of which two ledges have been cut. On one of them 500 feet of drifting has been done and on the other 75 feet. Supt. Williams states that he expects to strike a third ledge within another 100 feet on the crosscut. There is some work also on an upper tunnel and in a shaft. The ledges cut range from 4 to 20 feet wide. The ores found are sulphides. Granite, July 24.

G. H. Roberts is arranging to have a dredger built for his placer mine on Crane creek, a tributary of the John Day, where prospecting shows ground averaging 90 cents a cubic yard.

#### JOSEPHINE COUNTY.

A. Watts, owner of the Watts placer mine, on Williams creek, near Grants Pass, states that the cleanup for the season was over \$1000 for each man employed. The mine has been worked for thirty years.

#### LINN COUNTY.

Thompson & Finn of Cottage Grove have bought a half interest in the Harlow & Stocks mines in the Bohemian district. The property has 700 feet of tunnels and a 5-stamp mill. The new company, of which Mr. Finn is president and Mr. Thompson secretary and treasurer, has incorporated the mines. Some process for treating the ores other than the stamp-mill process is desired, as the latter does not save over half the values.

#### SOUTH DAKOTA.

##### CUSTER COUNTY.

The University Co. of Vermillion has bought a group of claims near Custer. The property will be developed in connection with another property owned by the same company. At the latter a steam hoisting plant has been installed. The Gold Fish Co. of Des Moines, Iowa, is sinking a shaft on the Salmon mine. Work has been resumed at the Lizzie mine by the Willow Creek M. Co. of LeMars, Iowa. A new shaft is to be sunk.

On Spring creek, near Custer, the Copper Butte Co. of Chicago and New York has opened a nickel-bearing ledge showing, 80 feet down, an average of 2% nickel and from 2% to 6% copper.

A Belgian firm has bonded the Sally Cavanaugh tin mine at Oreville.

#### UTAH.

##### BOX ELDER COUNTY.

The Mineral Hill G. M. Co. has been incorporated, capital \$25,000. M. Rump is president and F. Riepen secretary, with office in Salt Lake City. The company owns the Mineral Hill Nos. 1 to 4 mining claims.

##### SEVIER COUNTY.

J. H. Wells and associates have leased the Blue Eagle group, at Joseph, to E. Williams for eighteen months, with an option of purchase at \$7000.

Wells, Bingsly & Hopkins are working their mine at Joseph and are taking out ore.

##### SALT LAKE COUNTY.

The Tintic M. & D. Co. is said to be considering the preliminary plans of a pyritic smelter for ores from the Yampa mine at Bingham and ores from its Tintic properties. The plant as outlined is substantially the same as operated by the Bingham C. & G. M. Co., but will include converters, to produce bullion containing copper, gold and silver.

##### UTAH COUNTY.

Moore Bros. and W. B. Searle of Provo have bonded the Silver King mine for two years and expect to sink 200 feet of shaft. A royalty of 15% on ores extracted is to be paid and \$36,000 for the property.

##### WAYNE COUNTY.

The Wayne County C. M. Co. has been incorporated, capital \$30,000. E. D. Woodruff is president and D. M. Lindsay secre-

tary, with office at Salt Lake City. The company owns the Enterprise Nos. 1 to 12 mining claims.

#### WASHINGTON. FERRY COUNTY.

It is reported that Tacoma people are interested in a project to build a smelter at the mouth of Kettle river, on the line of the proposed railroad to Republic.

#### FOREIGN.

##### BRITISH COLUMBIA.

(Special Correspondence).—The Prospectors' Exchange of Nelson reports that a contract has been let to drive a 200-foot tunnel on the Commonwealth ledge, Crawford Bay district, and it is expected to so develop the property that regular shipments will be made. The Nelson smelter is now treating about 140 tons of Silver King ore per day. About ninety men are working at the Rambler mine, Slovan district; the force will shortly be increased and the shipments enlarged. At a meeting to be held by the Rambler M. Co., on the 25th of this month, one of the important subjects to be discussed will be the erection of a concentrator. A small force of men are employed on the Lavina group, Lardo district. About 1700 feet of work has been done on this property. The pay streak is 1 foot wide and carries silver-lead ore that gives values of \$100 per ton. The company expects to ship about 2000 tons of high-grade ore this season. The Camborne group on Fish river, Lardo district, has been bonded by A. F. Rosenberger for the Rosenberger syndicate. A cash payment of \$4000 was made. This property is said to possess the finest surface showing in the new camp. A force of 120 men are employed at the Slovan Star mine and mill. Shipments amounting to 186 tons were made last week. Nelson, July 23.

It is estimated that the total cleanup in Atlin this season will be \$750,000. More than half of this amount will come from the hydraulic mines on Pine creek.

The English syndicate of which Lord Ernest Hamilton is promoter has bought all the claims on McKee creek, Atlin, for \$120,000, and will clean up about \$60,000 this season.

The total cleanup of the Willow creek claims, Atlin, owned by T. Dunn and R. B. Skinner of Vancouver, will be about \$100,000.

The Burlington Co., operating the Iron Horse mine, near Sandon, is figuring on a steam hoisting and compressor plant with which to continue sinking the shaft.

The controlling interest in the Texada mine, Texada island, has been purchased by a company of which G. H. Walters of Spokane, Wash., is a member. The purchase price is reported to be about \$400,000. The Texada mine is a gold proposition.

#### Obituary.

FRANK A. REYNOLDS, mining engineer, died suddenly at Santa Fe, New Mexico, on the 29th ult., aged 46 years. He was a native of Placerville, California, growing up in the mines naturally into the profession that became his life work. Well and favorably known, he was identified with the early history and development of many of the great mining districts of the West, notably Tombstone, Ariz., and Cripple Creek, Colo.

JAMES E. MILLS, a noted geologist, died at San Fernando, Sinaloa, Mexico, on July 25, aged 67 years. For many years he had been connected with the mining enterprises of the elder Agassiz and of his son, Alexander Agassiz. In Plumas county, California, he was for many years in charge of extended placer mining operations for them, in the conduct of which he personally made extended surveys of the geology of the northern section of the Sierra Nevada mountains, preparing many maps and an extended monograph (unpublished). He published several short discussions on the same subject. At the date of his death, and for several years preceding it, he has been in charge of the development of two large and important Mexican gold-copper mines for Alexander Agassiz and his associates in the Calumet & Hecla mine. Deceased was a man of a kindly, lovable character, endeared by the association of many years to friends, who feel keenly their loss in his unexpected death.

#### Books Received.

THE A. Lietz Co. of San Francisco, Cal., has issued the fourth edition of the "Manual of Modern Surveying Instruments." The manual, aside from the catalogue and price list of surveying and scientific instruments, offers to engineers a compendium of useful technical information concerning the construction, care of and uses of these instruments. In illustration, text and matter it is an at-

tractive, useful reference volume for engineers and surveyors. Published by the A. Lietz Co., 422 Sacramento St., San Francisco, Cal. Price 50 cents.

#### Personal.

H. M. LAMB of Victoria, B. C., is in San Francisco, Cal.

G. W. STOKES, Supt. Phoenix mine, near Phoenix, Ariz., is in New York.

ROBERT DE LARGE is now Supt. Crown Point mine and mill, Crown Point, Ariz.

F. A. RICHMOND of New York is at Ely, Nevada, examining mines at that place.

COLIN MUNRO has resigned the superintendency of the Vivandiere mine at Turret, Colo.

HERBERT STRICKLAND is now Supt. Spearfish G. M. & Reduction Co. cyanide mill, Preston, S. D.

W. B. GESTER, M. E., has returned from Mexico and is engaged in professional work at Stella, Cal.

R. W. GORRILL, who has been examining petroleum deposits in Mexico, has returned to San Francisco, Cal.

NOBLE W. JONES, of Salt Lake City, Utah, is now assayer for the Dexter-Tuscarora Con. G. M. Co., Tuscarora, Nevada.

J. O. JONES, formerly of La Porte, Cal., has recently returned to San Francisco from a year's absence in Siberia examining mines.

DR. H. PAULI AND F. R. PIELER of Johannesburg, Transvaal, are examining methods of ore reduction in Utah and Montana mines.

H. H. NICHOLSON, consulting engineer American Mining Investment Co., Denver, Colo., is examining copper properties in Chihuahua, Mexico, for Boston men.

S. A. PARNALL has resigned as Supt. Old Dominion Copper Co., at Globe, Ariz., and has accepted the same position at the Manzanero copper mines, near Cananea, Sonora, Mexico.

ARTHUR V. CORRY, assayer and chemist Dexter-Tuscarora Cons. G. M. Co., Tuscarora, Nevada, has resigned to take charge of the Mont d'Or mine, in the Butte district, Montana.

G. I. PEABODY of Philadelphia, Pa., is in Oroville, Cal., examining methods of gold dredger operations. He is connected with gold dredging operations on the Atrato river, Colombia, South America.

#### Commercial Paragraphs.

JOHN HARRIGAN has removed his assay office from No. 10 to No. 19 Stevenson St., San Francisco, Cal.

"OLD scrap steel going to waste, now used by the newly invented process, mining and other tools made into shape, cast just as heretofore forged, cast ready for use, can be used up, then welded, forged and used again," says W. J. Wilson, who placed the Pittsburgh plant for the United States Steel Co., and who says he is looking for a location on the Pacific coast.

ALVIN PHILLIPS & Co., Denver, Colo., report the receipt of ores at their Denver ore-testing works from many and widely divergent points in the Western States, Mexico and Alaska. These works have been gradually enlarged and now include gas furnace for melting and refining bullion, equipment for cyanide, chlorination and concentration work; a reverberatory furnace and roll-jaw crusher and centrifugal rolls. Bartlett, Wilfey and Sperry concentrators are in use there.

AN entirely new electric generating power plant will be placed at Ouray, Colo., by the Revenue Tunnel Mines Co. A. E. Reynolds president, H. W. Reed general manager, to consist of two cross compound Reynolds direct connected condensing Corliss engines, with three 250 H. P. internal furnace marine type boilers, steam pressure 160 pounds. The generators will be made by the General Electric Co. The order for the engines, boilers and condensing apparatus was placed last week with the Denver office of the Allis-Chalmers Co. The power will be transmitted to the Revenue Tunnel mines across the mountain 12 miles from Ouray.

#### Recently Declared Mining Dividends.

|                                                                                  | Payable. |
|----------------------------------------------------------------------------------|----------|
| Alaska - Mexican G. M. Co., Alaska, quarterly, 10 cents per share, \$13,000..... | July 27  |
| Alaska-Treadwell M. Co., Alaska, quarterly, \$75,000.....                        | July 29  |
| Arizona C. M. Co., Arizona, \$4.44 a share, \$333,000.....                       | July 29  |
| Utah & Fish Springs M. Co., Utah, monthly 2 cents per share, \$2000.....         | July 31  |
| Pacific Coast Borax Co., California, \$1 per share.....                          | July 31  |
| Sacramento M. Co., Utah, monthly 1/2 cent per share, \$5000.....                 | Aug. 1   |

#### Latest Market Reports.

SAN FRANCISCO, Aug. 1, 1901.

SILVER.—Per oz., Troy: London, 26 1/2 d (standard ounce, 925 fine); New York, bar silver, 58 3/4 (1000 fine); San Francisco, 58 3/4; Mexican dollars, 47 1/2 San Francisco, 46c New York.

COPPER.—New York: Lake, 1 to 3 casks, \$17.25; carload lots, \$17.00; Electrolytic, 1 to 3 casks, \$16.75; carload lots, \$16.62 1/2; Casting, 1 to 3 casks, \$16.60; carload lots, 16.50. San Francisco: 18. Mill copper plates, 20c; bars, 22@23c. London: \$67 10s per ton.

LEAD.—New York, \$4.37 1/2; Salt Lake City, \$4.00; St. Louis, \$4.40; San Francisco \$4.90, carload lots; 5 1/2c 1000 to 4000 lbs.; pipe 6, sheet 6 1/2, bar 5 1/2; pig, \$5.25. London, \$11 15s per ton = 2.54 cents per lb.

SPELTER.—New York, \$4.20; St. Louis, \$3.75; London, \$16 2s 6d per ton = 3.58 1/2 cts. per lb; San Francisco, ton lots, 5 1/2c; 100-lb lots, 6c.

ANTIMONY.—New York, Cookson's, 10c; Hallett's, 9c; San Francisco, 1000-lb. lots, 10c; 300 to 500 lbs., 11c; 100-lb. lots, 13@15c.

IRON.—Pittsburg, Bessemer pig, \$16.00; gray forge, \$14.00; San Francisco, bar, per lb., 2.65c in small quantities.

STEEL.—Bessemer billets, Pittsburg, \$25; open hearth billets, \$27.00; San Francisco, bar, 7c to 12c per lb.

TIN.—New York, pig, \$27.50; San Francisco, ton lots, 30c; 1000 lbs., 30 1/2c; 500 lbs., 30 1/2c; less, 31c; bar tin, \$3 1/2, 35c.

QUICKSILVER.—New York, \$51.00 large lots; London, \$9 2s 6d; San Francisco, local, \$47.00 \$3 flask of 76 1/2 lbs.; Export, \$45.00.

MAGNESIUM.—New York, \$2.90 \$3 lb.; San Francisco, \$3.75.

ZINC.—San Francisco, 5 1/2c; slab, 5 1/2c; bar, 7c; zinc dust, N. Y., 8c.

BABBITT METAL.—San Francisco, No. 1, 10c.

SOLDER.—Half-and-half, 100-lb. lots, 19c; San Francisco, Plumbers', 100-lb. lots, 15 1/2c.

PHOSPHORUS.—F. o. b. New York 50@60c \$3 lb.

ASSAY LITHARGE.—San Francisco, 10c \$3 lb., small lots.

BISMUTH.—New York, \$3 lb., \$2.25 50-lb lots; San Francisco, \$2.50 to \$2.75 \$3 lb. lots.

PLATINUM.—San Francisco, crude, \$19 \$3 oz.; New York, \$20.50 per Troy oz. FERRO-MANGANESE.—Pittsburg, 80%, domestic, \$58.50, large lots.

TUNGSTEN.—New York, \$3 lb., 95c; San Francisco, \$1.15.

FERRO-TUNGSTEN.—New York, 37%, 32c; San Francisco, 65c (60%).

NICKEL.—New York, 50@60c \$3 lb.

ALUMINUM.—New York, No. 1, 99% pure ingots, 35c; No. 2, 90%, 30c to 35c.

POWDER.—F. o. b. San Francisco: No. 1, 70% nitro-glycerine, per lb., in carload lots, 15 1/2c; less than one ton, 17 1/2c. No. 1\*, 60%, carload lots, 13 1/2c; less than one ton, 15 1/2c. No. 1\*\* 50%, carload lots, 11 1/2c; less than one ton, 13 1/2c. No. 2, 40%, carload lots, 10c; less than one ton, 12c. No. 2\* 35%, carload lots, 9 1/2c; less than one ton, 11 1/2c. No. 2\*\* 30% carload lots, 9c; less than one ton, 11c. Black blasting powder in carload lots, minimum car 728 kegs, \$1.50 per keg; less car lots, \$2 per keg.

CAPS.—3x, \$5.50 per 1000; 4x, \$6.50; 5x, \$8; Lion, \$9, in lots not less than 1000.

FUSE.—Triple tape, \$3.60 per 1000 feet; double tape, \$3.00; single tape, \$2.65; Hemp, \$2.10; Cement No. 2, \$3.00; Cement No. 1, \$2.65, in lots of 3000 feet and up.

CANDLES.—Granite 6s, 16 oz., 40s., 9 1/2c \$3 set; 14 oz., 40s., 8 1/2c.

OILS.—Linsed, pure, boiled, bbl., 75c; cs., 80c; raw, bbl., 73c; cs., 78c. Deodorized Stove Gasoline, bulk, 14 1/2c; do., cs., 20 1/2c; 86° Gasoline, bulk, 20c; do., cs., 26c; 65° Naphtha or Benzine, deodorized, in bulk, per gal., 13 1/2c; do., in cs., 19 1/2c; Lard Oil, Extra Winter Strained, bbl., 75c; cs., 80c; No. 1 bbl., 50c; cs., 55c. Neatsfoot Oil, cooper's' bbls., 60c; cs., 65c; No. 1 bbl., 50@52 1/2c; cs., 55@57 1/2c.

CHEMICALS.—Cyanide of potassium, 98%-99%, jobbing, 32 1/2@33 1/2c \$3 lb.; carloads, 30@31c; in 10-lb. tins, 40c; sulphuric acid, in carboys, 66% B, 2c \$3 lb.; soda ash, \$1.90 \$3 100 lbs.; hyposulphite of soda, 2 1/2@3c \$3 lb.; blue vitriol, 5 1/2@6 1/2c \$3 lb.; borax, concentrated, 7@8c \$3 lb.; chlorate of potash, 12@13c; roll sulphur, 6c; alum, \$1.90@2.00; flour sulphur, French, 2 1/2@2 1/2c; California refined, 1 1/2@2c; nitric acid, in carboys, 8c \$3 lb.; caustic soda, in drums, 3@4c \$3 lb.; Cal. s. soda, bbls., \$1.00; ska, 95c \$3 100 lbs.; chloride of lime, spot, \$2.50@2.60; nitrate of potash, in kegs, 8c; caustic potash, 10c in 40-lb. tins.

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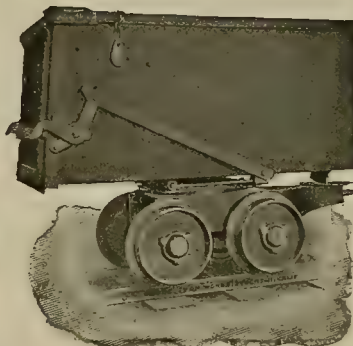
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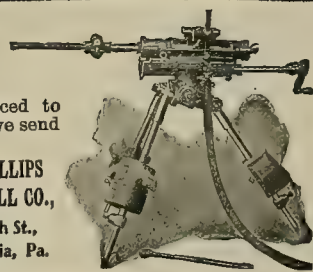
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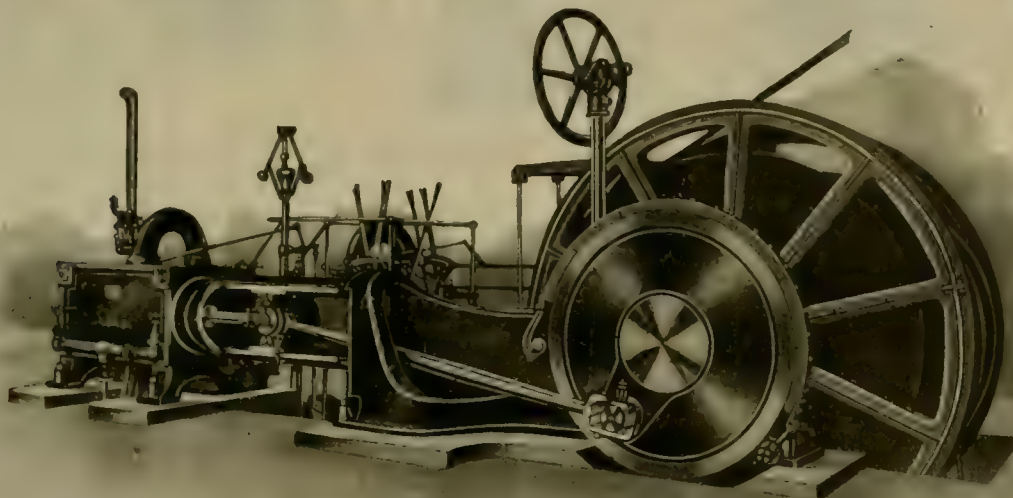
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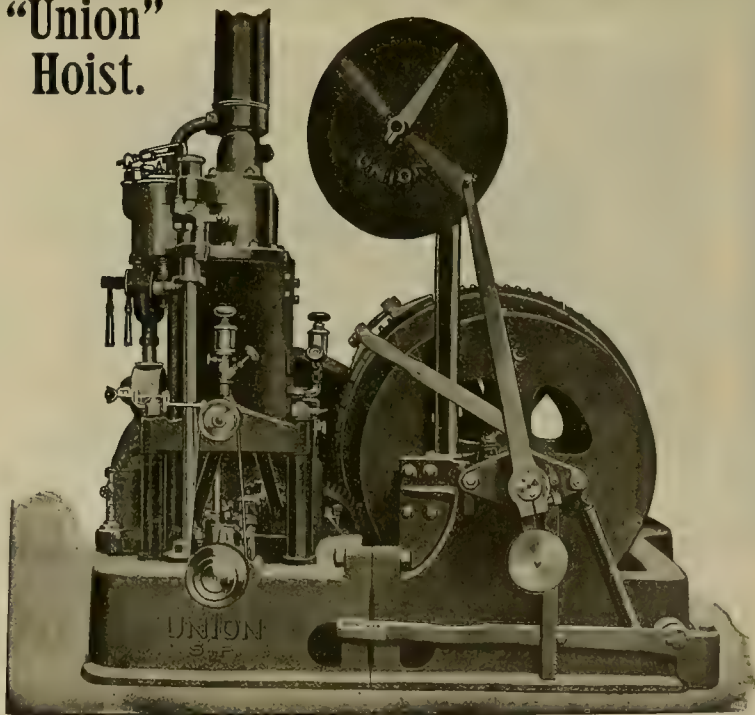
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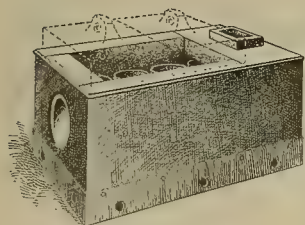
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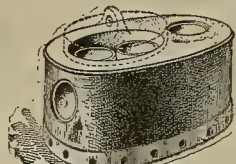
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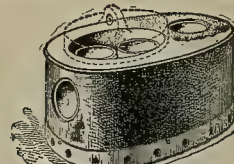
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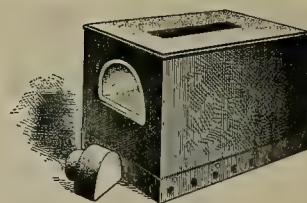
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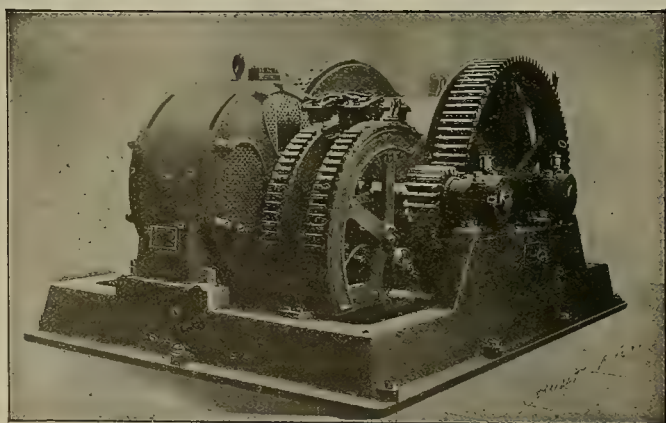
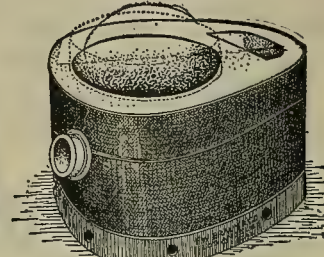
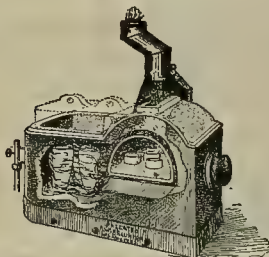
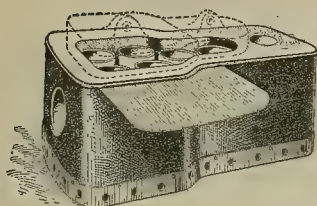
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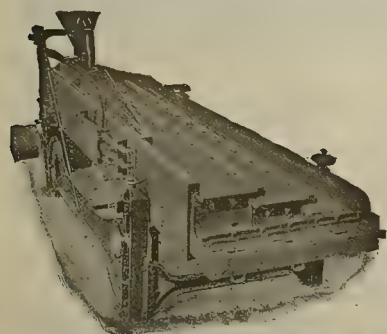
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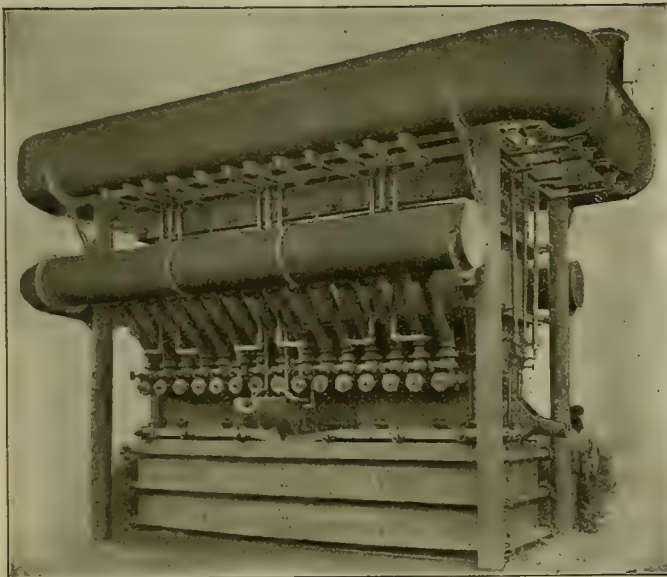
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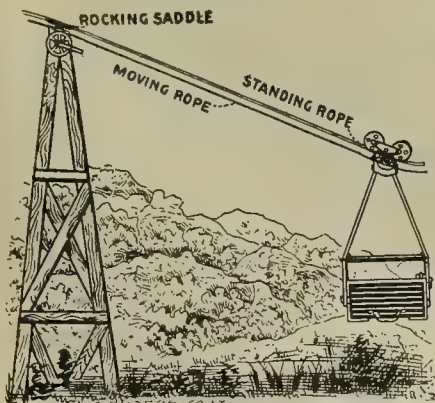
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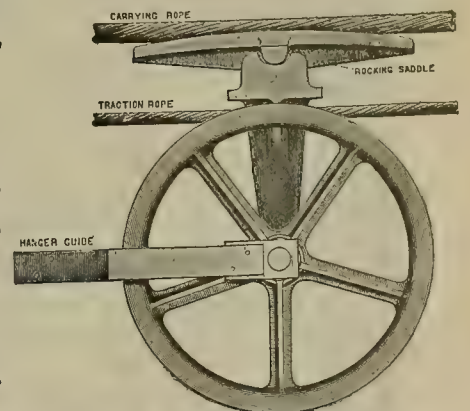
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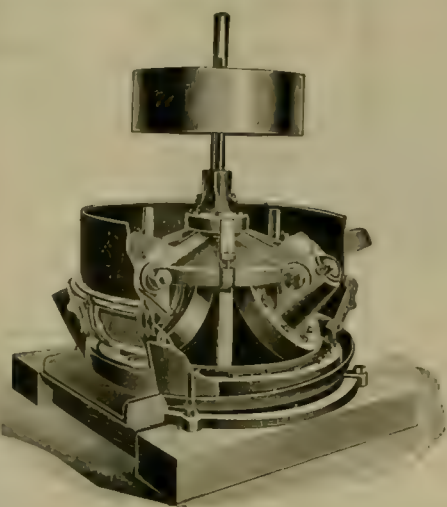
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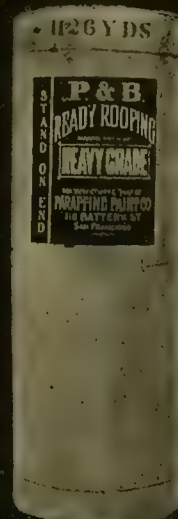
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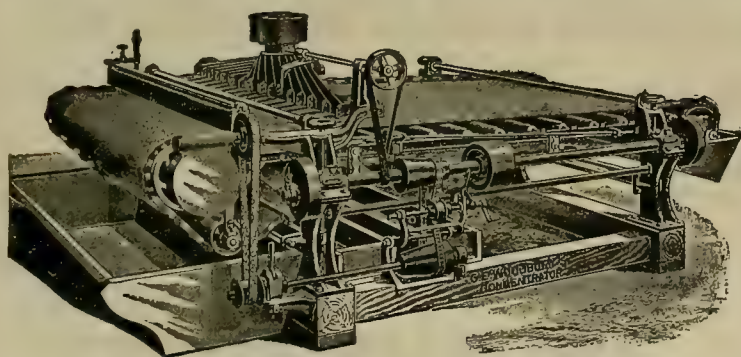
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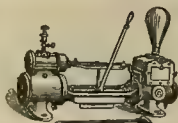
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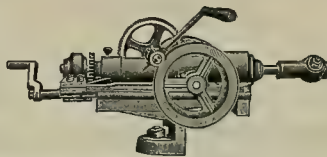
Rock Drills, Air Compressors, Mining Hoists, and Pumps for Compressed Air.  
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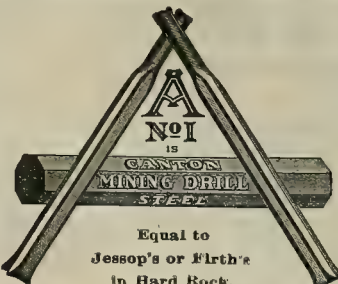


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If you require a high grade steel possessing toughness and  
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Equal to  
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THEY HAVE NO EQUAL FOR  
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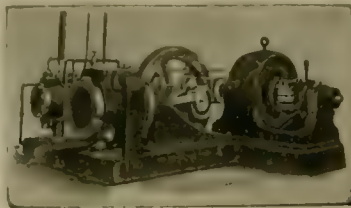
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OF THE SINGLE LIFT, CONTINUOUS BUCKET TYPE WITH

Working Capacity from 1500 to 5000 cubic yards per day,

AS DESIGNED AND MANUFACTURED BY

THE BUCYRUS COMPANY, South Milwaukee, Wis.  
IMPROVED GOLD SAVING DEVICE  
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DREDGES CONSTRUCTED COMPLETE UNDER  
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## "THE DANIEL BEST"

# 50-Horse Power Traction Engine.

Freight carrying capacity of wagons,  
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or a lot 1 capacity of train,  
48 TONS.



CAPACITY  
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Over One Hundred of these Powerful Engines in use on this Coast in the principal Logging and Lumbering Camps and for general freighting purposes.

EVERY ONE A SUCCESS AND MONEY MAKERS.

These outfits are particularly adapted to haul freight of any description from out-of-the-way places, and will reduce the cost of transportation at least one-half and in many instances two-thirds. They can generally be worked where animal teams now do the work, and haul their immense loads of from thirty to fifty tons, ascending and descending grades as much as 5 per cent to 30 per cent, depending upon condition of the road; loads may be increased to even greater amount on a firm and moderately level road.

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Estimates made for complete Steam Freighting Outfits. Address

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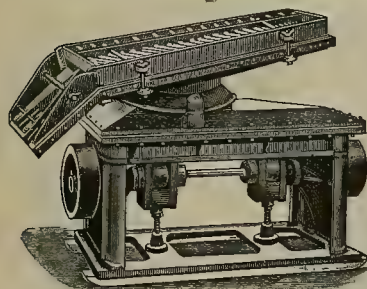
Basildon House, 7-11 Moorgate St.,  
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TREAT YOUR ORES,  
SAVE YOUR VALUES,  
CONCENTRATE  
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In substance at one operation  
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Floor Space, 3x6 Ft. Weight, 2250 Lbs.  
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WE USE NEITHER  
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Ores, etc., Treated:

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| Gold,   | Copper,     | Corundum,     |
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Capt. C. S. Collins, 58 Broad St., N. Y., says:  
"It's the best GOLD saver in the world."

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## The Hooper Pneumatic System

Is the only reliable method of treating mixed, silty or rebellious ores. Zinc and lead combinations handled in good shape where all other processes had failed.

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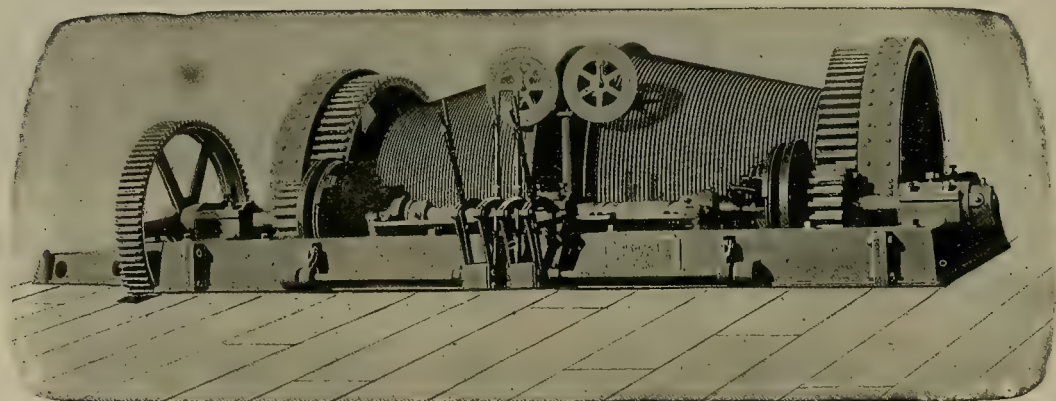
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200 H. P. DOUBLE DRUM ELECTRIC HOIST, OPERATED BY 60-CYCLE, 3-PHASE INDUCTION MOTOR.

Three of These Built for the British-American Corporation, Ltd., Rossland, B. C.

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## ADAMANTINE SHOES AND DIES.

\*\*\*\*\*CHROME CAST STEEL\*\*\*\*\*

CANDA Improved Self-Locking CAMS.

TAPPETS, BOSSES, ROLL SHELLS AND CRUSHER PLATES.

These castings are extensively used in all the mining States and Territories of North and South America. Guaranteed to prove better and cheaper than any others. Orders solicited subject to the above conditions. When ordering, send sketch with exact dimensions. Send for Illustrated Circular.

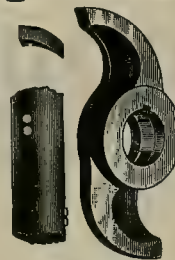
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For Elevating Tailings,  
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NO VALVES.  
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For houses not having gas or electric  
light service, and for those that have,  
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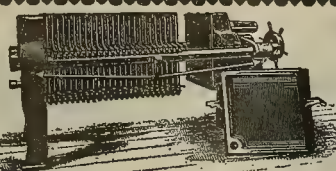
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## FOR REMOVING Slimes

BROMINE  
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Our FILTER PRESS

Removes all Slimes and Hastens the  
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# RISDON IRON WORKS.

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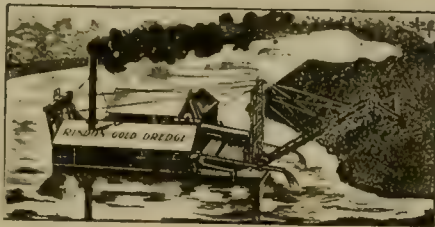
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to handle 2500 cubic yards per day at a cost of 3 cents per cubic yard.

We excavate 50 feet below water, 20 feet above water and handle boulders up to one ton weight.

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All sizes of Steel Water Pipe for City and Town Supply, Placer, Hydraulic and Quartz Mining. Cut, punched and rolled to be riveted at destination or made up complete.

We make a specialty of all kinds of Heavy Sheet Iron and Steel Work. Plans and Estimates furnished.

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Mine Draining or Hydraulicking.

WE DESIGN PUMPS FOR ALL CONDITIONS.

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In the paper read by the men  
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## TANKS!

AND COMPLETE

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Zinc Lathes with Automatic Feed  
FOR CUTTING ZINC SHAVINGS.

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## ASSESSMENT NOTICES.

**CONSOLIDATED ST. GOTHARD GOLD MINING COMPANY.**—Location of principal place of business, San Francisco, California; location of works, Nevada County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 9th day of July, 1901, an assessment (No. 19) of ten cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 113 Crocker Building, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 12th day of August, 1901, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 2d day of September, 1901, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

B. N. SHOECRAFT, Secretary.

Office—113 Crocker Building, San Francisco, California.

**EUREKA CONSOLIDATED DRIFT MINING COMPANY.**—Location of principal place of business, San Francisco, California; location of works, Placer County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 9th day of July, 1901, an assessment (No. 31) of one-half cent per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 214 Pine street, room 31, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 15th day of August, 1901, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 2d day of September, 1901, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

GEO. W. DIXON, Secretary.

Office—214 Pine street, room 31, San Francisco, California.

**THE BUTTE BASIN GRAVEL MINING COMPANY.**—Location of principal place of business, San Francisco, California; location of works, Amador County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 23rd day of July, 1901, an assessment (No. 3) of One Cent per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at his office, 35 Steuart street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 30th day of August, 1901, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 23rd day of September, 1901, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

O. E. HOLMES, Secretary.

Office—No. 35 Steuart street, San Francisco, California.

## DELINQUENT SALE NOTICE.

**YUBA CONSOLIDATED GOLD MINING COMPANY.**—Location of principal place of business, San Francisco, California; location of works, Nevada County, California.

Notice.—There are delinquent upon the following described stock, on account of assessment (No. 2) levied on the 22nd day of June, 1901, the several amounts set opposite the names of the respective shareholders, as follows:

| Names.         | No. | Cert. | No. | Shares. | Amt.    |
|----------------|-----|-------|-----|---------|---------|
| John Finn..... | 23  | 500   |     |         | \$15 00 |

And in accordance with law, and an order from the Board of Directors, made on the 22nd day of June, 1901, so many shares of each parcel of such stock as may be necessary, will be sold at public auction, at the office of the secretary, at Room 801 of the Claus Spreckels Building, corner of Third and Market Streets, San Francisco, California, on MONDAY, the 19th day of August, 1901, at the hour of 1 o'clock P. M. of said day, to pay said delinquent assessment thereon, together with costs of advertising and expenses of sale.

EDWARD H. STEARNS, Secretary.

Office—Room 801, Claus Spreckels Building, San Francisco, California.

## ANNUAL MEETING.

The Regular Annual Meeting of the Stockholders of the AMERICAN OIL AND REFINERY COMPANY will be held at the company's offices, Rooms 322-323 Parrott Building, 825 to 855 Market St., in the City and County of San Francisco, on MONDAY, the 19th day of August, 1901, at 1:30 P. M., for the election of directors for the ensuing year and the transaction of such other business as may properly come before the meeting.

J. C. ANTHONY, Secretary.



The Mining Man's Favorite Route

Denver, Colorado Springs, Pueblo and Ft. Collins, Cripple Creek, Leadville, Glenwood Springs, Aspen, Gunnison, Lake City, Creede, Durango, Silverton, Telluride and Ouray.

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## DELINQUENT SALE NOTICE.

**AMERICAN OIL AND REFINERY COMPANY.**—Location of principal place of business, San Francisco, California; location of works, Contra Costa County, California.

Notice.—There are delinquent upon the following described stock, on account of assessment (No. 2) levied on the 25th day of March, 1901, the several amounts set opposite the names of the respective shareholders, as follows:

| Names.                        | No.  | Cert.  | No. | Shares. | Amt.   |
|-------------------------------|------|--------|-----|---------|--------|
| Allen, S. L.....              | 110  | 12     |     |         | \$ 60  |
| Anderson, Mrs. Lulu.....      | 270  | 2      |     |         | 10     |
| Anthony, J. C., Trustee.....  | 747  | 1,000  |     |         | 50 00  |
| Anthony, J. C., Trustee.....  | 748  | 1,000  |     |         | 50 00  |
| Anthony, J. C., Trustee.....  | 749  | 1,000  |     |         | 50 00  |
| Anthony, J. C., Trustee.....  | 500  | 50     |     |         | 25 00  |
| Anthony, J. C., Trustee.....  | 501  | 50     |     |         | 25 00  |
| Anthony, J. C., Trustee.....  | 502  | 500    |     |         | 25 00  |
| Anthony, J. C., Trustee.....  | 503  | 500    |     |         | 25 00  |
| Anthony, J. C., Trustee.....  | 531  | 50     |     |         | 25 00  |
| Anthony, J. C., Trustee.....  | 973  | 1,000  |     |         | 50 00  |
| Avery, Mrs. Jennie.....       | 716  | 5      |     |         | 25     |
| Avery, Mrs. Jennie.....       | 723  | 5      |     |         | 25     |
| Barto, Harrison.....          | 808  | 2,500  |     |         | 125 00 |
| Barto, Harrison.....          | 812  | 500    |     |         | 25 00  |
| Barto, Harrison.....          | 813  | 500    |     |         | 25 00  |
| Barto, Harrison.....          | 814  | 500    |     |         | 25 00  |
| Benecke, Diederich.....       | 93   | 1      |     |         | 5      |
| Borkman, Mrs. Augusta.....    | 712  | 85     |     |         | 1 75   |
| Brown, Mrs. Ida M.....        | 152  | 7      |     |         | 35     |
| Buckley Morris.....           | 788  | 50     |     |         | 2 50   |
| Carr, H. W.....               | 719  | 5      |     |         | 25     |
| Conn, Mrs. Sarah A.....       | 529  | 100    |     |         | 5 00   |
| Conn, Mrs. S. A.....          | 692  | 25     |     |         | 1 25   |
| Corbiere, C. C.....           | 564  | 250    |     |         | 12 50  |
| Corbiere, C. C.....           | 565  | 5      |     |         | 25     |
| Crew, L. T.....               | 206  | 2      |     |         | 10     |
| Cridge, A. D.....             | 540  | 1      |     |         | 5      |
| Cumberson, Mrs. Maria L.....  | 471  | 5      |     |         | 25     |
| Donnelly, Mary M.....         | 49   | 14     |     |         | 70     |
| Dunlap, Mrs. W. B.....        | 526  | 10     |     |         | 50     |
| Donahue, Benj. S.....         | 1141 | 50     |     |         | 25 00  |
| Bella, Charles P.....         | 984  | 2,000  |     |         | 100 00 |
| Bella, Charles P.....         | 1127 | 10,000 |     |         | 500 00 |
| Estey, J. C.....              | 1045 | 100    |     |         | 5 00   |
| Estey, J. C.....              | 1048 | 20     |     |         | 1 00   |
| Falls, Sarah.....             | 557  | 40     |     |         | 2 00   |
| Felroy, Mrs. Maria W.....     | 173  | 5      |     |         | 25     |
| Flak, Andrew J.....           | 866  | 2      |     |         | 10     |
| Freese, A. J.....             | 6    | 40     |     |         | 2 00   |
| Freese, A. J.....             | 7    | 40     |     |         | 2 00   |
| Freese, A. J.....             | 9    | 50     |     |         | 2 50   |
| Freese, A. J.....             | 273  | 10     |     |         | 50     |
| Freese, A. J.....             | 279  | 10     |     |         | 50     |
| Freese, A. J.....             | 280  | 20     |     |         | 1 00   |
| Freese, A. J.....             | 281  | 20     |     |         | 1 00   |
| Freese, A. J.....             | 282  | 20     |     |         | 1 00   |
| Freese, A. J.....             | 283  | 20     |     |         | 1 00   |
| Freese, A. J.....             | 284  | 345    |     |         | 17 25  |
| Freese, A. J.....             | 450  | 20     |     |         | 1 00   |
| Freese, A. J.....             | 659  | 50     |     |         | 2 50   |
| Freese, A. J.....             | 671  | 9      |     |         | 45     |
| Hildebrandt, Henry.....       | 257  | 1,000  |     |         | 50 00  |
| Hildebrandt, Henry.....       | 258  | 1,000  |     |         | 50 00  |
| Hoover, John D., Trustee..... | 981  | 667    |     |         | 33 35  |
| Hoover, John D., Trustee..... | 1050 | 453    |     |         | 21 65  |
| Hoover, Miss Esther.....      | 979  | 100    |     |         | 5 00   |
| Holbrook, W. E., Trustee..... | 897  | 10,000 |     |         | 500 00 |
| Holbrook, W. E., Trustee..... | 898  | 11,000 |     |         | 550 00 |
| Holbrook, W. E., Trustee..... | 899  | 4,500  |     |         | 225 00 |
| Holbrook, W. E., Trustee..... | 900  | 4,500  |     |         | 225 00 |
| Holbrook, W. E., Trustee..... | 901  | 2,000  |     |         | 100 00 |
| Holbrook, W. E., Trustee..... | 902  | 2,000  |     |         | 100 00 |
| Holbrook, W. E., Trustee..... | 903  | 2,000  |     |         | 100 00 |
| Holbrook, W. E., Trustee..... | 904  | 2,000  |     |         | 100 00 |
| Holbrook, W. E., Trustee..... | 905  | 2,000  |     |         | 100 00 |
| Holbrook, W. E., Trustee..... | 906  | 1,000  |     |         | 50 00  |
| Holbrook, W. E., Trustee..... | 907  | 1,000  |     |         | 50 00  |
| Holbrook, W. E., Trustee..... | 908  | 1,000  |     |         | 50 00  |
| Holbrook, W. E., Trustee..... | 909  | 1,000  |     |         | 50 00  |
| Holbrook, W. E., Trustee..... | 910  | 1,000  |     |         | 50 00  |
| Holbrook, W. E., Trustee..... | 911  | 1,000  |     |         | 50 00  |
| Holbrook, W. E., Trustee..... | 912  | 1,000  |     |         | 50 00  |
| Holbrook, W. E., Trustee..... | 913  | 2,000  |     |         | 100 00 |
| Holbrook, W. E., Trustee..... | 914  | 2,000  |     |         | 100 00 |
| Holbrook, W. E., Trustee..... | 915  | 2,000  |     |         | 100 00 |
| Holbrook, W. E., Trustee..... | 916  | 2,000  |     |         | 100 00 |
| Holbrook, W. E., Trustee..... | 917  | 2,000  |     |         | 100 00 |
| Holbrook, W. E., Trustee..... | 918  | 2,000  |     |         | 100 00 |
| Holbrook, W. E., Trustee..... | 919  | 2,000  |     |         | 100 00 |
| Holbrook, W. E., Trustee..... | 920  | 2,000  |     |         | 100 00 |
| Holbrook, W. E., Trustee..... | 921  | 2,000  |     |         | 100 00 |
| Holbrook, W. E., Trustee..... | 922  | 2,000  |     |         | 100 00 |
| Holbrook, W. E., Trustee..... | 923  | 2,000  |     |         | 100 00 |
| Holbrook, W. E., Trustee..... | 924  | 2,000  |     |         | 100 00 |
| Holbrook, W. E., Trustee..... | 925  | 2,000  |     |         | 100 00 |
| Holbrook, W. E., Trustee..... | 926  | 2,000  |     |         | 100 00 |
| Holbrook, W. E., Trustee..... | 927  | 2,000  |     |         | 100 00 |
| Holbrook, W. E., Trustee..... | 928  | 2,000  |     |         | 100 00 |
| Holbrook, W. E., Trustee..... | 929  | 2,000  |     |         | 100 00 |
| Holbrook, W. E., Trustee..... | 930  | 2,000  |     |         | 100 00 |
| Holbrook, W. E., Trustee..... | 931  | 2,000  |     |         | 100 00 |
| Holbrook, W. E., Trustee..... | 932  | 2,000  |     |         | 100 00 |
| Holbrook, W. E., Trustee..... | 933  | 2,000  |     |         | 100 00 |
| Holbrook, W. E., Trustee..... | 934  | 2,000  |     |         | 100 00 |
| Holbrook, W. E., Trustee..... | 935  | 2,000  |     |         | 100 00 |
| Holbrook, W. E., Trustee..... | 936  | 2,000  |     |         | 100 00 |
| Holbrook, W. E., Trustee..... | 937  | 2,000  |     |         | 100 00 |
| Holbrook, W. E., Trustee..... | 938  | 2,000  |     |         | 100 00 |
| Holbrook, W. E., Trustee..... | 939  | 2,000  |     |         | 100 00 |
| Holbrook, W. E., Trustee..... | 940  | 2,000  |     |         | 100 00 |
| Holbrook, W. E., Trustee..... | 941  | 2,000  |     |         | 100 00 |
| Holbrook, W. E., Trustee..... | 942  | 2,000  |     |         | 100 00 |
| Holbrook, W. E., Trustee..... | 943  | 2,000  |     |         | 100 00 |
| Holbrook, W. E., Trustee..... | 944  | 2,000  |     |         | 100 00 |
| Holbrook, W. E., Trustee..... | 945  | 2,000  |     |         | 100 00 |
| Holbrook, W. E., Trustee..... | 946  | 2,000  |     |         | 100 00 |
| Holbrook, W. E., Trustee..... | 947  | 2,000  |     |         | 100 00 |
| Holbrook, W. E., Trustee..... | 948  | 2,000  |     |         | 100 00 |
| Holbrook, W. E., Trustee..... | 949  | 2,000  |     |         | 100 00 |
| Holbrook, W. E., Trustee..... | 950  | 2,000  |     |         | 100 00 |
| Holbrook, W. E., Trustee..... | 951  | 2,000  |     |         | 100 00 |
| Holbrook, W. E., Trustee..... | 952  | 2,000  |     |         | 100 00 |
| Holbrook, W. E., Trustee..... | 953  | 2,000  |     |         | 100 00 |
| Holbrook, W. E., Trustee..... | 954  | 2,000  |     |         | 100 00 |
| Holbrook, W. E., Trustee..... | 955  | 2,000  |     |         | 100 00 |
| Holbrook, W. E., Trustee..... | 956  | 2,000  |     |         | 100 00 |
| Holbrook, W. E., Trustee..... | 957  | 2,000  |     |         | 100 00 |
| Holbrook, W. E., Trustee..... | 958  | 2,000  |     |         | 100 00 |
| Holbrook, W. E., Trustee..... | 959  | 2,000  |     |         | 100 00 |
| Holbrook, W. E., Trustee..... | 960  | 2,000  |     |         | 100 00 |
| Holbrook, W. E., Trustee..... | 961  | 2,000  |     |         | 100 00 |
| Holbrook, W. E., Trustee..... | 962  | 2,000  |     |         | 100 00 |
| Holbrook, W. E., Trustee..... | 963  | 2,000  |     |         | 100 00 |
| Holbrook, W. E., Trustee..... | 964  | 2,000  |     |         | 100 00 |
| Holbrook, W. E., Trustee..... | 965  | 2,000  |     |         | 100 00 |
| Holbrook, W. E., Trustee..... | 966  | 2,000  |     |         | 100 00 |
| Holbrook, W. E., Trustee..... | 967  | 2,000  |     |         | 100 00 |
| Holbrook, W. E., Trustee..... | 968  | 2,000  |     |         | 100 00 |
| Holbrook, W. E., Trustee..... | 969  | 2,000  |     |         | 100 00 |
| Holbrook, W. E., Trustee..... | 970  | 2,000  |     |         | 100 00 |
| Holbrook, W. E., Trustee..... | 971  | 2,000  |     |         | 100 00 |
| Holbrook, W. E., Trustee..... | 972  | 2,000  |     |         | 100 00 |
| Holbrook, W. E., Trustee..... | 973  | 2,000  |     |         | 100 00 |
| Holbrook, W. E., Trustee..... | 974  | 2,000  |     |         | 100 00 |
| Holbrook, W. E., Trustee..... | 975  | 2,000  |     |         | 100 00 |
| Holbrook, W. E., Trustee..... | 976  | 2,000  |     |         | 100 00 |
| Holbrook, W. E., Trustee..... | 977  | 2,000  |     |         | 100 00 |
| Holbrook, W. E., Trustee..... | 978  | 2,000  |     |         | 100 00 |
| Holbrook, W. E., Trustee..... | 979  | 2,000  |     |         | 100 00 |
| Holbrook, W. E., Trustee..... | 980  | 2,000  |     |         | 100 00 |
| Holbrook, W. E., Trustee..... | 981  | 2,000  |     |         | 100 00 |
| Holbrook, W. E., Trustee..... | 982  | 2,000  |     |         | 100 00 |
| Holbrook, W. E., Trustee..... | 983  | 2,000  |     |         | 100 00 |
| Holbrook, W. E., Trustee..... | 984  | 2,000  |     |         | 100 00 |
| Holbrook, W. E., Trustee..... | 985  | 2,000  |     |         | 100 00 |
| Holbrook, W. E., Trustee..... | 986  | 2,000  |     |         | 100 00 |
| Holbrook, W. E., Trustee..... | 987  | 2,000  |     |         | 100 00 |
| Holbrook, W. E., Trustee..... | 988  | 2,000  |     |         | 100 00 |
| Holbrook, W. E., Trustee..... | 989  | 2,000  |     |         | 100 00 |
| Holbrook, W. E., Trustee..... | 990  | 2,000  |     |         | 100 00 |
| Holbrook, W. E., Trustee..... | 991  | 2,000  |     |         | 100 00 |
| Holbrook, W. E., Trustee..... | 992  | 2,000  |     |         | 100 00 |
| Holbrook, W. E., Trustee..... | 993  | 2,000  |     |         | 100 00 |
| Holbrook, W. E., Trustee..... | 994  | 2,000  |     |         | 100 00 |
| Holbrook, W. E., Trustee..... | 995  | 2,000  |     |         | 100 00 |
| Holbrook, W. E., Trustee..... | 996  | 2,000  |     |         | 100 00 |
| Holbrook, W. E., Trustee..... | 997  | 2,000  |     |         | 100 00 |
| Holbrook, W. E., Trustee..... | 998  | 2,000  |     |         | 100 00 |
| Holbrook, W. E., Trustee..... | 999  | 2,000  |     |         | 100 00 |
| Holbrook, W. E., Trustee..... | 1000 | 2,000  |     |         | 100 00 |
| Holbrook, W. E., Trustee..... | 1001 | 2,000  |     |         | 100 00 |
| Holbrook, W. E., Trustee..... | 1002 | 2,000  |     |         | 100 00 |
| Holbrook, W. E., Trustee..... | 1003 | 2,000  |     |         | 100 00 |
| Holbrook, W. E., Trustee..... | 1004 | 2,000  |     |         | 100 00 |
| Holbrook, W. E., Trustee..... | 1005 | 2,000  |     |         | 100 00 |
| Holbrook, W. E., Trustee..... | 1006 | 2,000  |     |         | 100 00 |
| Holbrook, W. E., Trustee..... | 1007 | 2,000  |     |         | 100 00 |
| Holbrook, W. E., Trustee..... | 1008 | 2,000  |     |         | 100 00 |
| Holbrook, W. E., Trustee..... | 1009 | 2,000  |     |         | 100 00 |
| Holbrook, W. E., Trustee..... | 1010 | 2,000  |     |         | 100 00 |
| Holbrook, W. E., Trustee..... | 1011 | 2,000  |     |         | 100 00 |
| Holbrook, W. E., Trustee..... | 1012 | 2,000  |     |         | 100 00 |
| Holbrook, W. E., Trustee..... | 1013 | 2,000  |     |         | 100 00 |
| Holbrook, W. E., Trustee..... | 1014 | 2,000  |     |         | 100 00 |
| Holbrook, W. E., Trustee..... | 1015 | 2,000  |     |         | 100 00 |
| Holbrook, W. E., Trustee..... | 1016 | 2,000  |     |         | 100 00 |
| Holbrook, W. E., Trustee..... | 1017 | 2,000  |     |         | 100 00 |
| Holbrook, W. E., Trustee..... | 1018 | 2,000  |     |         | 100 00 |
| Holbrook, W. E., Trustee..... | 1019 | 2,000  |     |         | 100 00 |
| Holbrook, W. E., Trustee..... | 1020 | 2,000  |     |         | 100 00 |
| Holbrook, W. E., Trustee..... | 1021 | 2,000  |     |         | 100 00 |
| Holbrook, W. E., Trustee..... | 1022 | 2,000  |     |         | 100 00 |
| Holbrook, W. E., Trustee..... | 1023 | 2,000  |     |         | 100 00 |
| Holbrook, W. E., Trustee..... | 1024 | 2,000  |     |         | 100 00 |
| Holbrook, W. E., Trustee..... | 1025 | 2,000  |     |         | 100 00 |
| Holbrook, W. E., Trustee..... | 1026 | 2,000  |     |         | 100 00 |
| Holbrook, W. E., Trustee..... | 1027 | 2,000  |     |         | 100 00 |
| Holbrook, W. E., Trustee..... | 1028 | 2,000  |     |         | 100 00 |
| Holbrook, W. E., Trustee..... | 1029 | 2,000  |     |         | 100 00 |
| Holbrook, W. E., Trustee..... | 1030 | 2,000  |     |         | 100 00 |
| Holbrook, W. E., Trustee..... | 1031 | 2,000  |     |         | 100 00 |
| Holbrook, W. E., Trustee..... | 1032 | 2,000  |     |         | 100 00 |
| Holbrook, W. E., Trustee..... | 1033 | 2,000  |     |         | 100 00 |
| Holbrook, W. E., Trustee..... | 1034 | 2,000  |     |         | 100 00 |
| Holbrook, W. E., Trustee..... | 1035 | 2,000  |     |         | 100 00 |
| Holbrook, W. E., Trustee..... | 1036 | 2,000  |     |         | 100 00 |
| Holbrook, W. E., Trustee..... | 1037 | 2,000  |     |         | 100 00 |
| Holbrook, W. E., Trustee..... | 1038 | 2,000  |     |         | 100 00 |
| Holbrook, W. E., Trustee..... | 1039 | 2,000  |     |         | 100 00 |
| Holbrook, W. E., Trustee..... | 1040 | 2,000  |     |         | 100 00 |
| Holbrook, W. E., Trustee..... | 1041 | 2,000  |     |         | 100 00 |
| Holbrook, W. E., Trustee..... | 1042 | 2,000  |     |         | 100 00 |
| Holbrook, W. E., Trustee..... | 1043 | 2,000  |     |         | 100 00 |
| Holbrook, W. E., Trustee..... | 1044 | 2,000  |     |         | 100 00 |
| Holbrook, W. E., Trustee..... | 1045 | 2,000  |     |         | 100 00 |
| Holbrook, W. E., Trustee..... | 1046 | 2,000  |     |         | 100 00 |
| Holbrook, W. E., Trustee..... | 1047 | 2,000  |     |         | 100 00 |
| Holbrook, W. E., Trustee..... | 1048 | 2,000  |     |         | 100 00 |
| Holbrook, W. E., Trustee..... | 1049 | 2,000  |     |         | 100 00 |
| Holbrook, W. E., Trustee..... | 1050 | 2,000  |     |         | 100 00 |
| Holbrook, W. E., Trustee..... | 1051 | 2,000  |     |         | 100 00 |
| Holbrook, W. E., Trustee..... | 1052 | 2,000  |     |         | 100 00 |
| Holbrook, W. E., Trustee..... | 1053 | 2,000  |     |         | 100 00 |
| Holbrook, W. E., Trustee..... | 1054 | 2,000  |     |         | 100 00 |
| Holbrook, W. E., Trustee..... | 1055 | 2,000  |     |         | 100 00 |
| Holbrook, W. E., Trustee..... | 1056 | 2,000  |     |         | 100 00 |
| Holbrook, W. E., Trustee..... | 1057 | 2,000  |     |         | 100 00 |
| Holbrook, W. E., Trustee..... | 1058 | 2,000  |     |         | 100 00 |
| Holbrook, W. E., Trustee..... | 1059 | 2,000  |     |         | 100 00 |
| Holbrook, W. E., Trustee..... | 1060 | 2,000  |     |         | 100 00 |
| Holbrook, W. E., Trustee..... | 1061 | 2,000  |     |         | 100 00 |
| Holbrook, W. E., Trustee..... | 1062 | 2,000  |     |         | 100 00 |
| Holbrook, W. E., Trustee..... | 1063 | 2,000  |     |         | 100 00 |
| Holbrook, W. E., Trustee..... | 1064 | 2,000  |     |         | 100 00 |
| Holbrook, W. E., Trustee..... | 1065 | 2,000  |     |         | 100 00 |
| Holbrook, W. E., Trustee..... | 1066 | 2,000  |     |         | 100 00 |
| Holbrook, W. E., Trustee..... |      |        |     |         |        |



# 200,000 H. P.

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OPERATING

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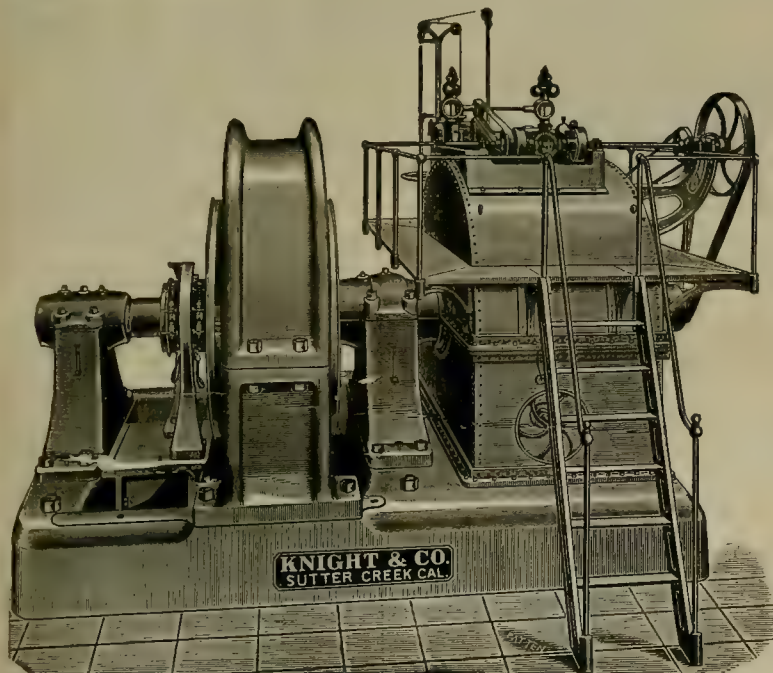
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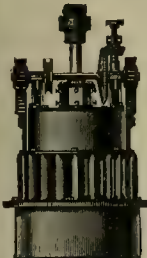
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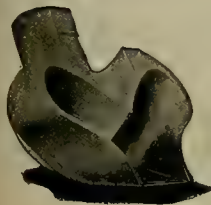
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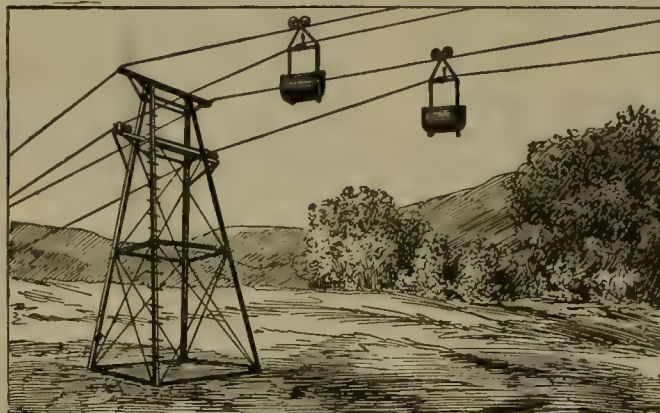
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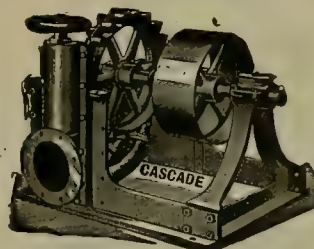
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It is particularly adapted for gritty water.

It is very strongly and yet compactly built, so as to occupy as small a space as possible.

It can be operated in any desired position, either vertical or horizontal.

This pump is an improvement in many ways over other makes of sinking pumps.

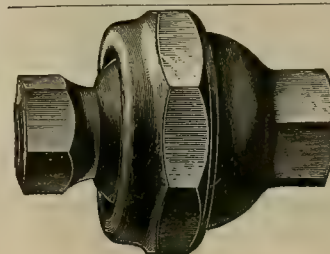
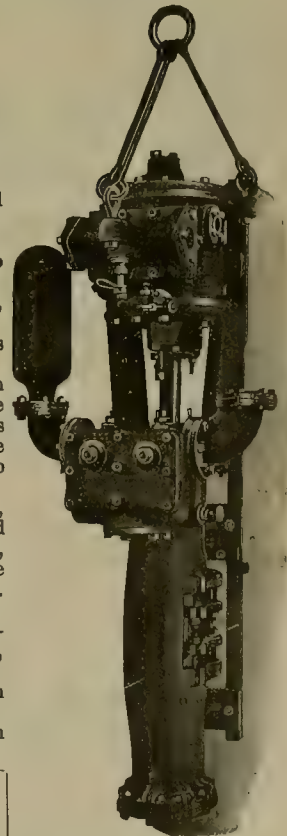
The cap under the Plunger is fastened with Hinge Bolts, one bolt retaining the cap after the rest are released. Also providing Priming Valves in the Water Valve Chest Cover to prime the Lower Valves from Column Pipe, and they are so close as to be in no danger of breaking off.

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 BOISE, IDAHO.

**RELIABLE ASSAYS.**  
 Gold, \$1.00; Silver, \$1.00; Lead, \$1.00; Copper, \$1.00; Zinc, \$1.00; Nickel, \$1.00; Tin, \$1.00; Platinum, \$1.00; Iron, \$1.00; Manganese, \$1.00; Potassium, \$1.00; Sodium, \$1.00; Magnesium, \$1.00; Calcium, \$1.00; Barium, \$1.00; Strontium, \$1.00; Bismuth, \$1.00; Antimony, \$1.00; Arsenic, \$1.00; Tellurium, \$1.00; Selenium, \$1.00; Iodine, \$1.00; Bromine, \$1.00; Chlorine, \$1.00; Fluorine, \$1.00; Oxygen, \$1.00; Hydrogen, \$1.00; Nitrogen, \$1.00; Carbon, \$1.00; Silicon, \$1.00; Phosphorus, \$1.00; Sulfur, \$1.00; Magnesium, \$1.00; Calcium, \$1.00; Barium, \$1.00; Strontium, \$1.00; Bismuth, \$1.00; Antimony, \$1.00; Arsenic, \$1.00; Tellurium, \$1.00; Selenium, \$1.00; Iodine, \$1.00; Bromine, \$1.00; Chlorine, \$1.00; Fluorine, \$1.00; Oxygen, \$1.00; Hydrogen, \$1.00; Nitrogen, \$1.00; Carbon, \$1.00; Silicon, \$1.00; Phosphorus, \$1.00; Sulfur, \$1.00; Magnesium, \$1.00; Calcium, \$1.00; Barium, \$1.00; Strontium, \$1.00; Bismuth, \$1.00; Antimony, \$1.00; Arsenic, \$1.00; 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DEARBORN DRUG & CHEMICAL WORKS,  
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WM H EDGAR, President.

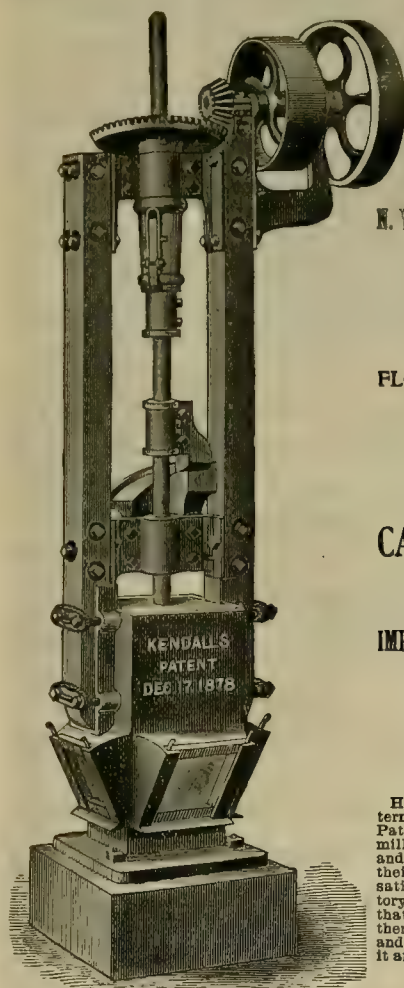
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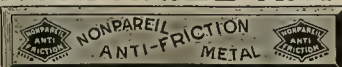
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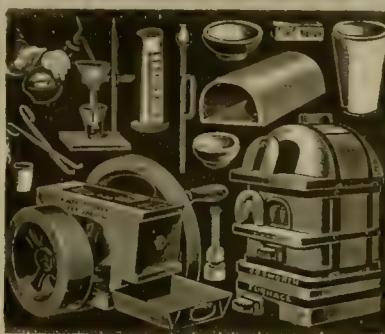
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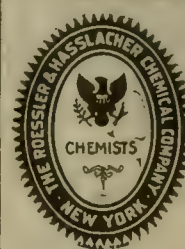
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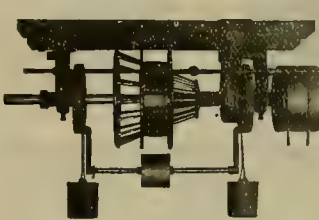
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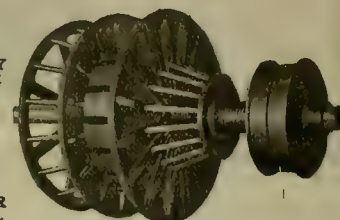
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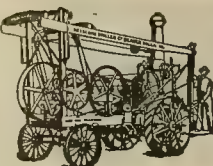
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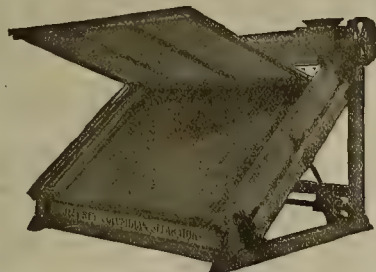
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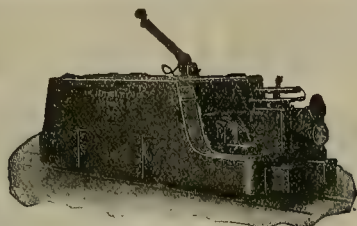
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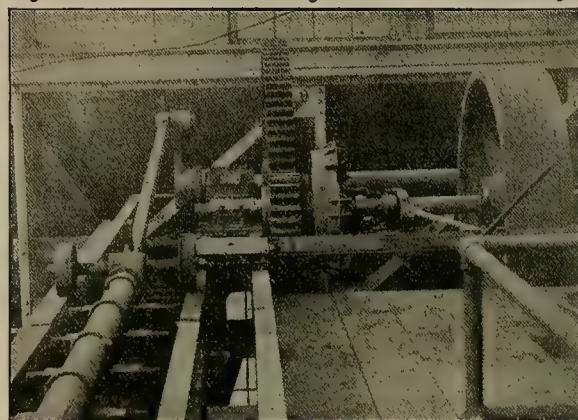
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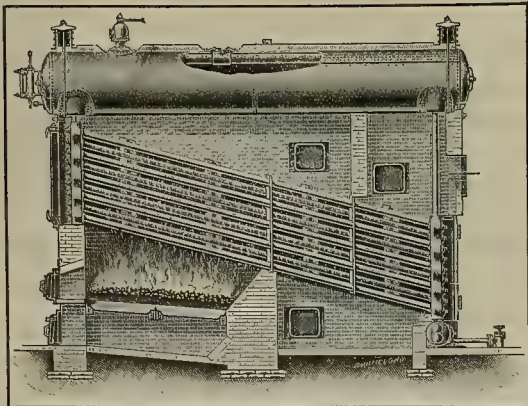
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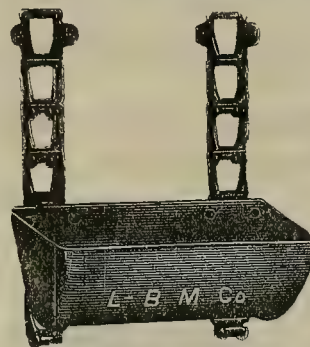
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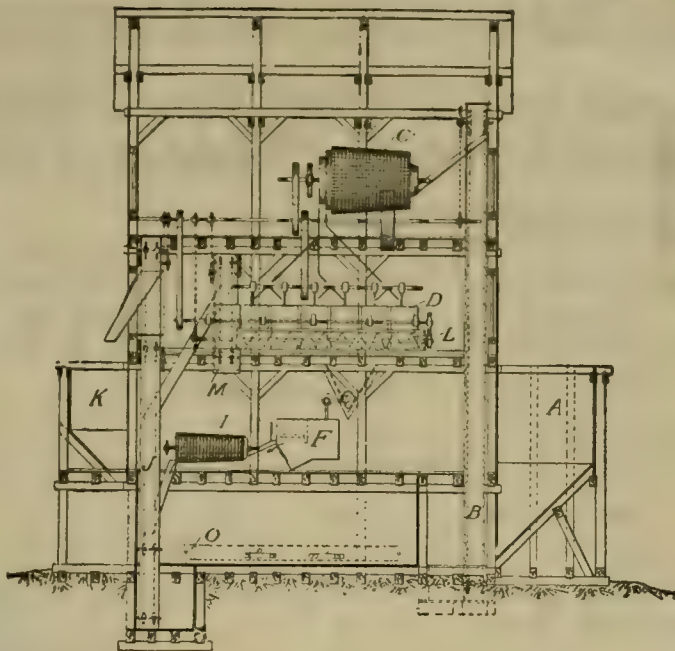
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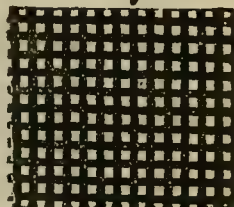
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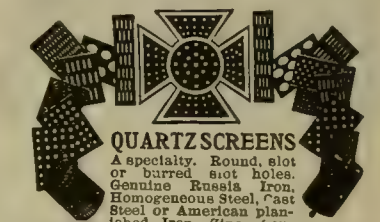


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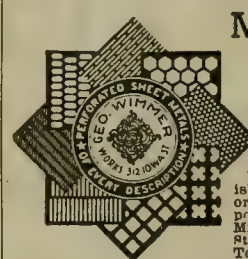
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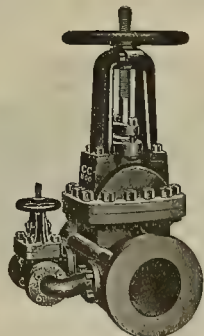
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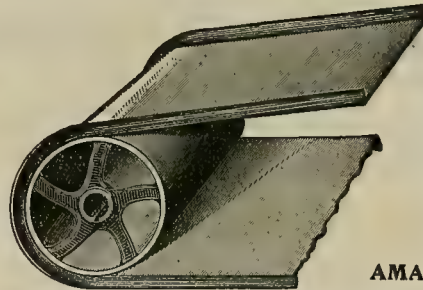
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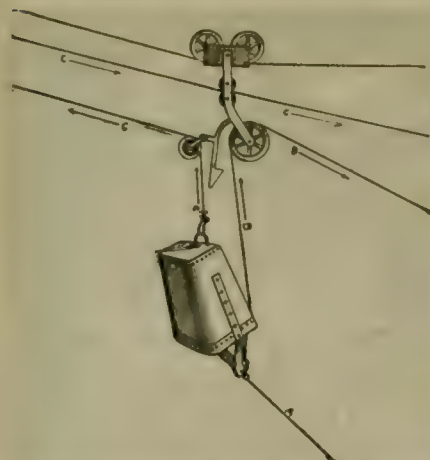
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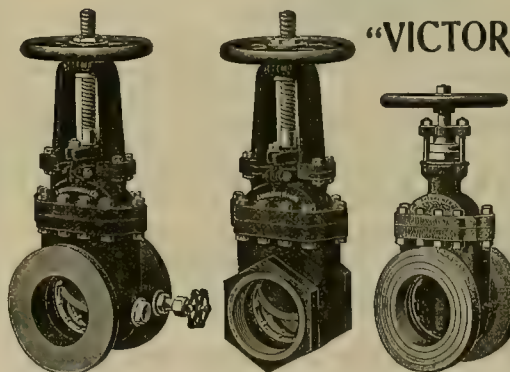
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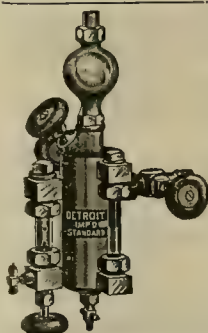
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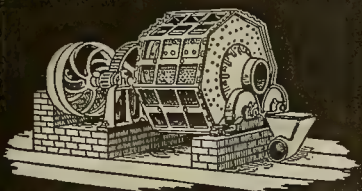
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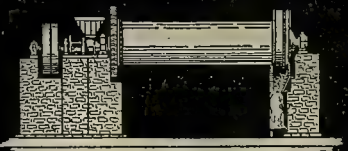
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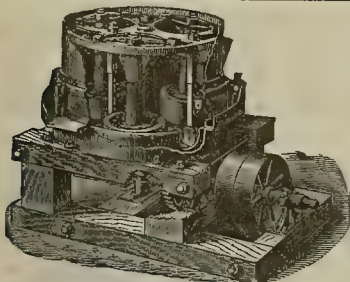
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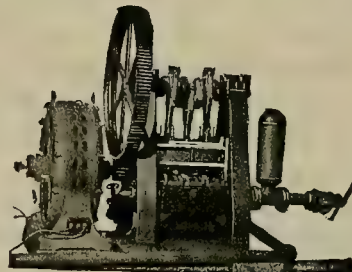


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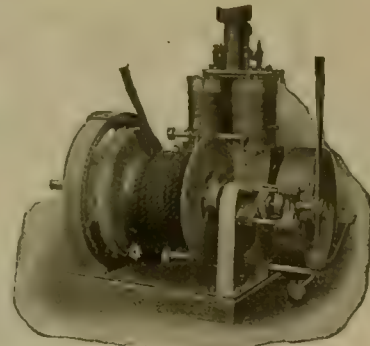
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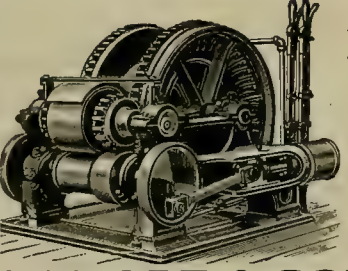


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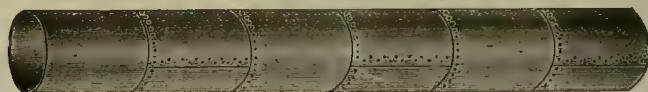
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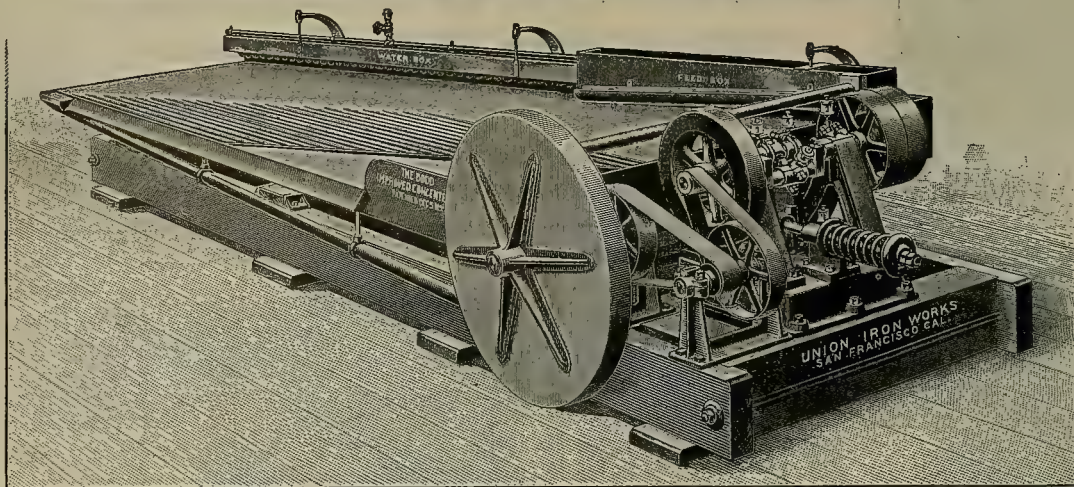
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Whole No. 2142.—VOLUME LXXXIII.  
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SAN FRANCISCO, SATURDAY, AUGUST 10, 1901.

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## Gold Mining in the Sea Bottom.

Alaska experience has made known many novel conditions and kinds of placer mining. Mining under moss, mining at the terminals of glaciers, burning one's way through perpetually frozen ground to the bedrock, getting out dumps in winter to be washed in summer, reversing the old California way of getting out dumps in summer for winter washing, were all novel placer mining experiences of the Klondike a very few years since. Later, with the discovery of gold at Nome, beach mining became in turn the novelty to attract popular attention.

The illustration on this page is of a still later placer mining novelty. The miners are boring through the ice in Behring sea, a quarter of a mile off the shore at Nome City, to prospect the bottom of the sea beneath. The photograph from which the illustration was made was taken on June 1st of this year. The time of year is itself a novelty for an exploration beneath the ice and gives some idea of the long period during which work of this kind is possible on the edge of the Arctic circle.

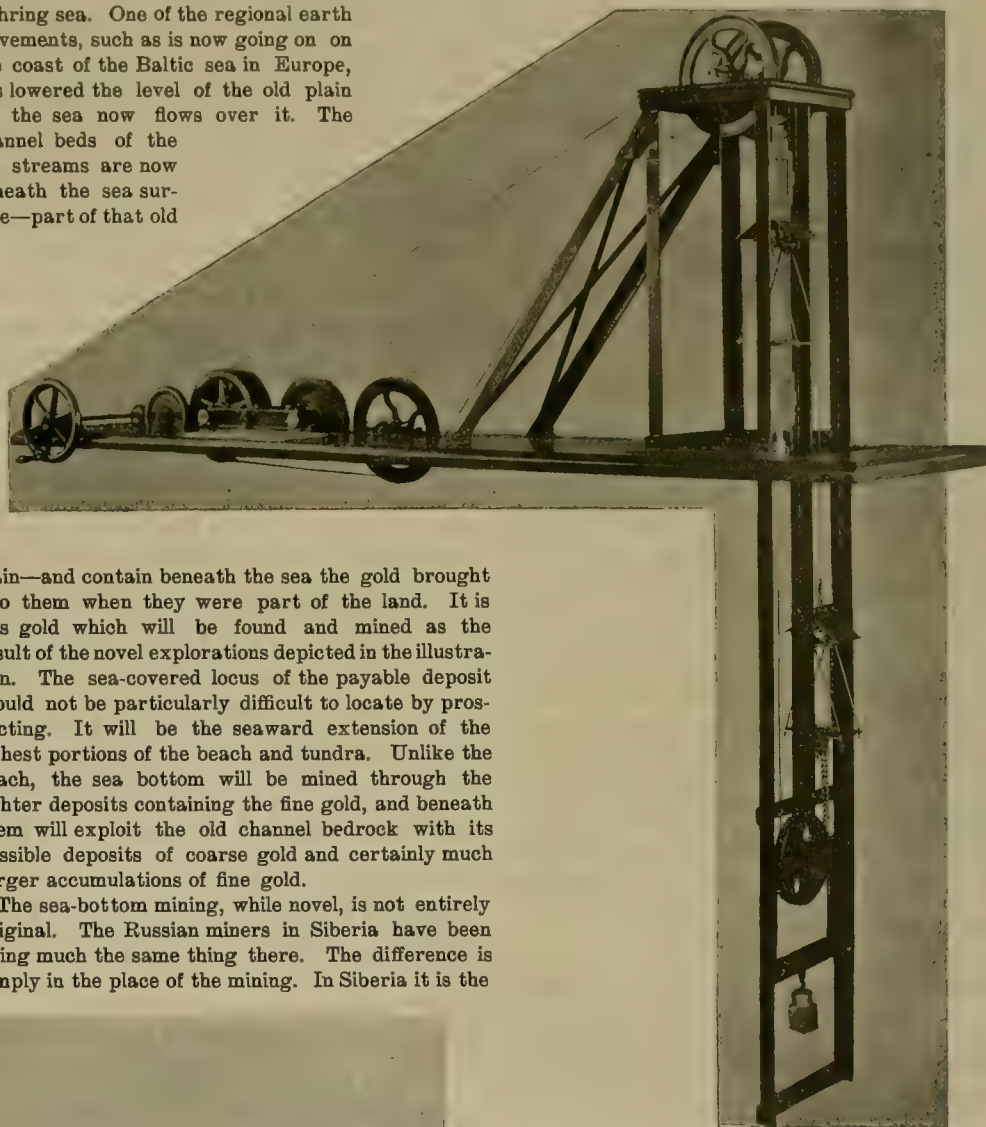
The beach at Nome is flat and beneath the sea slopes away so gently that at the quarter mile distance, where the boring—or, more exactly, shaft digging—in the ice is going on, the sea is still so shallow that it is solid ice to the bottom. Diving suits are not necessary. There is no water at the sea bottom to contend with.

Geologically, there is no reason why such explorations of the sea bottom at Nome—but not the sea bottom at any or every other place—should not develop payable placers. The stream whose old beds and channels have proven so rich in gold in the high lands back of Nome once had a comparatively direct line of flow from the high lands, through the tundra as it now is, and through a gently sloping valley, occupying an area now covered by the waters of

Behring sea. One of the regional earth movements, such as is now going on on the coast of the Baltic sea in Europe, has lowered the level of the old plain till the sea now flows over it. The channel beds of the old streams are now beneath the sea surface—part of that old

plain—and contain beneath the sea the gold brought into them when they were part of the land. It is this gold which will be found and mined as the result of the novel explorations depicted in the illustration. The sea-covered locus of the payable deposit should not be particularly difficult to locate by prospecting. It will be the seaward extension of the richest portions of the beach and tundra. Unlike the beach, the sea bottom will be mined through the lighter deposits containing the fine gold, and beneath them will exploit the old channel bedrock with its possible deposits of coarse gold and certainly much larger accumulations of fine gold.

The sea-bottom mining, while novel, is not entirely original. The Russian miners in Siberia have been doing much the same thing there. The difference is simply in the place of the mining. In Siberia it is the



Experimental Model for Electric Hoists for Comstock Mines.  
(See Page 55.)



Boring Through the Ice of Behring Sea, Nome City, Alaska, Prospecting for Gold.

stream beds that have been mined. The Russian miner's practice is to cut out from the ice the area he designs to make his shaft. This exposes a water surface. Poles are then forced vertically down on the sides of the shaft to the bottom of the stream. The water again freezes on the exposed surface and also freezes behind the poles. The freshly frozen ice is cut out and the ice formed behind the poles makes a wall, preventing the further influx of water. The miner then thaws the bottom of the stream bed with fire and removes to the stream banks what he wishes of it within the limits of his shaft. Later in summer he washes up his dump and recovers the gold.

This mining of the sea bottom through the ice can not fail to make some amendments to the law of placer locations in Alaska. The bottom of the sea is not public land of the United States. Neither when the sea is frozen can it be called navigable waters. Just how the dredger rights that were to be granted to work the sea bottom at Nome are going to be construed in connection with drifting beneath the ice is not clear. The admiralty cases do not furnish precedents for deciding titles to mining claims.



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ESTABLISHED 1860.

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THE Canadian Government has made an order directing the payment of a rebate of 1% on Klondike gold delivered at the Dominion Assay Office at Vancouver when accompanied with the certificate showing that the royalty had been paid. The rebate will be very satisfactory to the Klondike miners and is the equivalent of making the royalty 4% in place of 5%. It is an aid to the industry of gold mining in the Klondike by giving it a wider profit margin.

A KANSAS assessor has announced a new method of determining the valuation of mines for assessment. He proposes that the mine owner should make a declaration of value and that the declaration should have the effect of an offer to sell at a figure 10% higher, any person being permitted to buy. The absurdity of this seriously presented proposition, even though it comes from Kansas, should emphasize the necessity for public enlightenment and comprehension of the true principles on which taxation of mines should be based.

WHILE the Government of the Dominion of Canada is reducing the royalty on the Yukon gold production, and generally aiming to reduce the incidental burdens on placer mining, the Government of the Province of British Columbia is doing the opposite of this in Atlin. The latest order requires the royalty tax to be paid on the first day of every month, instead of once every quarter. The change is a vexatious and costly one to mine owners, compelling them to lose time as well as money, as they are compelled by the order to report at Atlin every month, even if there is no production at all from their claims.

THE Selby Smelting and Refining Works, through which has passed in the nearly forty years of its establishment at San Francisco almost all the gold and silver production, not alone of California, but of the Pacific coast, suffered from a robbery of about \$280,000 on the morning of the 6th inst. The thieves tunneled from the outside of the works at Selby in Contra Costa county, Cal., and entered the bullion storeroom by cutting through the steel floor. The loss was in gold bullion, part refined and part stored pending the refining. The loss does not affect the solvency of the company and depositors of bullion lose nothing. The loss to the company is the first made by theft in its history, during which nearly one thousand millions of dollars worth of gold and silver have been melted and refined. Detectives are at work, and it is sincerely hoped that the stolen treasure may be recovered: \$25,000 reward is offered for apprehension and conviction of the thieves and recovery of the bullion. Meanwhile there is no cessation of business.

## Two Kinds of Miners' Unions.

At the present time demands are being made for a higher rate of wages for mine laborers employed as shovelers or muckers in some gold mines in New Zealand and in some gold mines in British Columbia.

In New Zealand the muckers in the gold mines of one of the districts are demanding an increase in their wages. They claim that they are underpaid for the work they do and justly should have more pay. Their employers claim the profit of gold mining is so small that it will not admit of the increase. The men have made their appeal to a permanent Board organized by law, in which each party is represented equally by men of its own choosing. The workmen have a union, membership in it not being a matter of election by existing members, but by the free choice of the workman himself. The workman is a member practically by reason of doing that particular class of work. There are other unions of laborers in the other branches of mining labor. There has been no strike, no offer to strike, and no discharge of complaining laborers by employers. The other labor unions have not interfered. It is only the affair of the men directly interested. The permanent Board is hearing both sides. Its decision will be binding, unless an appeal be taken by either party to another Board for cause. Such appeal is rarely taken. The rate of wages when fixed by the Board continues in force for at least two years. All of this procedure is the orderly operation of law. It is the action of all the people in the country recognizing its organized society interest in the welfare and business, not of one individual or class, but of all individuals and all classes. The State itself is economically a labor union, and the State gives, in fact, to each individual the equity that it guarantees in theory.

In British Columbia at Rossland the men who work as muckers are demanding an increase in wages. They have a union in which membership is a matter of election by the members already organized. Other laborers to whom they refuse election to the union are not permitted—by force, if necessary—to work at that occupation. There are other unions of mine workers organized on the same principle. Refused the increase in wages, the appeal is made to the other unions. All have struck, and, refusing to work themselves, refuse to permit others to work in their places. Organized society—the State—has no legal procedure by which it can adjudicate the difference conclusively. It has no procedure for preventing the industrial disorganization consequent on a strike. It has no power protecting the owners of mines in their use against the physical power of labor unions.

Both New Zealand and British Columbia are British colonies. Each is in the control of its local affairs more paramount than any State of the United States. In both the political power of the labor union is paramount. But the labor unions are not the same in the two Provinces. In New Zealand the labor union is a union of all employers and all who labor. It is the State. It is responsible. If labor has an equitable right to reasonable wages and maintenance of employment, so, too, has the employer an equitable right to the conditions which permit fair wages and continuous work. Neither is permitted to injure the other, and the real facts control findings, regardless of who may be sustained in the special contention. On the other hand, while in British Columbia the political power of the labor union is paramount, the power is exercised by a self-elected faction of the people, and represents what they consider their personal policy, regardless of the equities of those not of their labor union faction. The labor union is not a union of all employers and all men who labor. It is a union of a self-elected portion of the men who labor. It has as an organization no place in law. It is wholly irresponsible.

Broadly speaking, the New Zealand idea of labor union is constructive of society; the British Columbia idea is destructive of society. The difference starts with the difference between responsibility and irresponsibility. The difference in the two countries to the men and society, the State, or the public, as a result of the difference of method employed by workmen doing the same kind of work, and making the same demand of their employers, is measured by an enormous sum of productive energy.

In New Zealand no laborer stops working, no employer is permitted to stop working, pending a

determination of the facts. Both parties meet equally before the law and are equally bound by its judgment. If the laborer is given what he asks, he is bound to accept it for a definite time. There is no loss of productive energy anywhere. There is only a more equitable distribution of its production. Every man has a right to work and is insured a just wage for his labor. The employer is not restricted in the use, enjoyment or reproductive power of his capital.

In British Columbia every laborer stops working, not alone those who consider they have a grievance, but every laborer in other branches of the same trade, and laborers in other trades as well, entirely independent of any direct material interest in the difference. The employers are stopped by force from working. Neither party is before the law. There are no judgments. If the laborer is given what he asks, he is not bound to continue accepting it for any period of time at all. There is the loss of the productive energy of an entire community, or it may be several communities, till the difference is adjusted. Every man does not have a right to work. No man is insured just wages for his labor. The employer is restricted in the use, enjoyment and reproductive power of his capital.

New Zealand shows what responsible, lawful labor union does for the laborer and for society. British Columbia shows what irresponsible, unlawful labor union does for the laborer and for society. The details of how New Zealand does it are not essential. The essential element is responsibility.

## Bad Mine Management.

The incidence of explanation for many mining operations which are discontinued before they become profit-earning is put on that ancient scapegoat "bad management." It is easily applied as an excuse, is not readily controverted by facts, and contributes best to the chance of passing the cost of failure on to others. It is always the most satisfactory to the local interests where the mine is situated, on the ground that it does not operate to prevent the revival of the mining operation.

That good mines always make good mine managers is a proposition not usually questioned. Nevertheless it is disputable. Very good mines do pay under very bad and wasteful management. In fact, such mines are the ones everyone wants. To the suggestion that a certain mine would pay with good management, one of the old mine operators is quoted as saying: "That the kind of a mine he wanted was one that did not have to have good management, but would pay with bad management."

In fairness to mine managers and superintendents, who are as a class, men of exceptional ability and special qualification for their business, the charge of bad management should be used far more discriminately than it is. Mineral deposits must be explored and tested before it can be known if they are commercially exploitable. Mine managers and superintendents have to be in charge of such work. It is safe to say that they use the best judgment that can be made on facts as they appear, and plan intelligently for the ultimate end. The critic who condemns the result, or manner of operating toward it, without being as advised at the beginning as was the mine manager, is illogical and unjust.

All mining work, even exploratory, must be accomplished as part of a plan. The avoidance of waste is a consideration of the first importance. Other conditions being equal, the plans of exploration or prospecting should be such that the work performed and expenditure made, can, subsequently, if the prospecting be satisfactory, become part of the ultimate scheme of exploitation. Yet it is just this kind of intelligent planning that meets with the most severe criticism of the uninformed and unthinking as being bad management, in case the operation is abandoned. Actually, however, such planned work, seemingly a waste, is in reality an economy. It demonstrates that the particular mineral deposit is not a mine the more conclusively and at a minimum of cost.

It is always safe to question the charge of bad management of a mine as the cause of its failure. The mere assertion should not be accepted as its own proof. If the question is material, examine the real facts from the beginning and form conclusions from them. Bad mine management is more often a scapegoat than a cause.



## Concentrates.

IN a locomotive's firebox 175 gallons oil are equivalent to a ton bituminous coal.

GOLD in clear quartz crystal is not uncommon; native silver in the same matrix is quite rare.

THE load on a belt transmission remaining constant, substituting a wider belt will not operate to prevent slipping.

WOLFRAMITE carrying 60% tungstic acid with favorable mining and freight conditions might warrant development. The demand is limited, practically none, locally.

A NET FALL of 400 feet to the mile will provide power to operate a suspended cable transportation plant by gravity. Where the fall is less, auxiliary power in proportion is required for proper operation.

LARGE fine crystals of any rare mineral and of many minerals that are not uncommon have a commercial value as specimens for mineral cabinets. The demand is generally in excess of the supply offering.

THE bulletin on the cyanide process, issued by the California State Mining Bureau, can be obtained by application to the State Mineralogist, San Francisco, remitting price (39 cents), which includes postage.

THE work required to compress one pound of air adiabatically from atmospheric pressure and 60° temperature to ninety pounds pressure is about one and one-third times as much as to compress it isothermally.

AVERAGE practice with direct-acting steam power pumps in large installations can be safely estimated on to require the consumption of 16.67 pounds of bituminous coal for every 1336 cubic feet of water lifted one foot.

THE waste dumps taken out in making the first mine openings can be used for filling the voids made later in exploiting the ore bodies. In some instances quite an economy of cost of timbering is effected by their use.

WHERE mine waters contain even small percentages of sulphate of copper, iron pipes and iron pump cylinders and fittings are rapidly corroded. Hoisting the mine water in buckets is under such conditions usually most economical.

A LIZARD is a rough form of sled used with animals to move ore down hill over trails not practicable for wagons or carts. It is a tree fork covered with a pole or plank bed to hold sacked ore. It is, under the conditions used, cheaper than packing.

By the use of portable jackets and clamps, thermite, the form of aluminum employed in welding, may be employed to weld the joints of water or steam pipes after they have been put in position. The joints made by the welds are as strong as other portions of the pipe.

NOVACULITE is the name of a variety of sandstone rock, extensively developed in Arkansas, which is used largely as the material from which whetstones, oilstones and small grinding wheels are made. It is a very dense, fine-grained stone, composed of nearly pure silica.

SPECIMEN GOLD can be cleaned of rust by boiling in dilute nitric acid. What is known as rusty or coated gold is commercially cleaned of the rust sufficiently to amalgamate by grinding in pans. Some of this latter class of gold can only be recovered by concentration with the sulphurets.

IN cleaning the object glass of a telescope it should not be rubbed in the cleaning. Dust should be brushed off with a camel's-hair brush and the glass should then be lightly and carefully wiped with a clean piece of chamois leather. If very dirty, wash with alcohol, water and soft chalk which contains no grit.

THE grade or fall of sluice boxes varies from a minimum fall of 2½ inches to a 12-foot box to 12 inches, or even 14 inches, to that length. Ten inches fall is common practice with large sluices and large heads of water. The very low heads are never desirable and are only used where there is a scarcity of dump fall.

A CHANGE in the voltage under which a long distance electric transmission is made will make an opposite change in the percentage of loss of the current transmitted. The current at the generator being constant, an increase in the voltage decreases the line loss of transmission, and a decrease in the voltage increases the line loss of transmission.

HEADS of water up to 1700 feet are in use or planned for use with tangential water wheels in electric power plants. The very high heads are not desirable, particularly in large installations, on account of the excessive quantities of structural material necessary to insure safety. A head of water of about 600 feet is regarded as more desirable and economical with large units than higher heads.

THE best way to find the average weight of ore or waste in a mine carload is to weigh a stock pile of twenty-five to forty tons. Let the mine car man fill his cars from this, keeping a record of the number. A division then gives an average weight that can be used with the mine run of output. The suggested method, though somewhat more trouble than weighing occasional carloads, is more accurate.

THEORETICALLY, the loss of energy from the heating of the air during compression made adiabatically is—the

initial temperature being 60° Fahr. and gauge pressure 110 pounds—about 38% for a single-stage compressor, 17% with two-stage and 5% with four-stage compressor. With a gauge pressure of 2000 pounds, single-stage compression makes a loss of 121%, double-stage 45% and four-stage 20%.

THE government of the quantity of water discharged on a water wheel under high heads or from long pipe lines cannot safely be effected by changing the flow in the pipe line. The only safe methods are by shifting the stream on or off of the wheel by a deflecting nozzle or by a combination which, while it throttles the stream passing through the nozzle, opens a by-pass discharging the water cut off from passage through the nozzle. The first described method is in practical use.

COKE CONCRETE employed for special constructions can be made by specifications as follows: The mixture consists of four parts of coke by measure broken to pass 1½-inch mesh and be retained by ½-inch mesh; two measures of coke screened through a ½-inch mesh, but retained by a ¼-inch mesh; and one measure of cement. Coke to be of best quality furnace coke—hard, free from dust and dirt and thoroughly saturated with water before mixing. The mixing is effected in the ordinary manner.

SOME waste of gold, or rather some unrecovered gold in stamp mill operation, may be an actual economy of cost. Assuming for example that a finer crushing makes a higher percentage of saving, the amount of that additional recovery to the ton must be measured, not only against the added cost of milling per ton by reason of fewer tons treated, but must offset an added amount based on the general operative costs of the mining as well. Decreased tonnage milled increases mining costs as well as mill charges per ton.

SPRINGING A HOLE in blasting consists in shooting the bottom of the hole with a light charge of powder to enlarge it so that it will take the main charge of powder close at the bottom of the hole and accomplish more breaking effect. From one-half a stick to two sticks of ½-inch powder are used in springing. The cap and fuse are tied into the cartridge, into which the light springing charges are made, placed in the bottom of the hole, and exploded either with a light tamping cover or none at all. Sometimes a second springing is given before loading to break.

DIAMONDS are found in three widely separated districts in the United States. In no one of them has there yet been a development of quantity sufficient to make a commercially exploitable mine. In California diamonds have been found in Butte, El Dorado and Calaveras counties in the Sierra Nevada watersheds of the Sacramento and San Joaquin rivers. In Georgia, North Carolina, Tennessee, Kentucky, Alabama and South Carolina diamonds have been found at a number of points in the Appalachian mountains. In Wisconsin, Michigan, Indiana and Ohio, in the vicinity of what is described by the U. S. Geologic Survey as the Green Bay lobe of the continental glacier.

THE ordinary form of T rail used in metal mines is not the best form for that purpose. The defect is in the distribution of the metal. The web is deeper than necessary and the tread narrower. The narrow tread cuts car wheels rapidly, shortening their life. For this reason a sixteen-pound-to-the-yard rail is sometimes used to get a wider tread and save in the cost of replacing car wheels where a twelve-pound-to-the-yard rail would otherwise answer. The T rail form and weight that would most generally answer requirements would have a tread slightly wider than the sixteen pounds of the ordinary type, and a short web, and would weigh about fourteen pounds to the yard.

THE bars of gold-bearing streams are frequently noted as having a successive annual renewal of the deposit of placer gold, in amount occasionally sufficient to pay for working. This gold is invariably fine float gold and is left on the surface of the bar by the receding flood-water flow. It is largely, in California, the fine gold which passes the sluices and hydraulic mines higher up stream. While, as noted, frequently sufficient in amount to pay for working, it will only pay for very limited operation by rocker or sluice. The gold is on or close to the surface only and the pay deposits of a bar rarely has much superficial extent. It is not safe to conclude from pay results from rocker work that dredging will be profitable.

THE time a shift is allowed to load its holes, remove tools from the face, and shoot, varies between limits of twenty to thirty minutes. Where in the count of shots it appears that one or more have missed it should be the duty of the shift doing the shooting to investigate and shoot any missed holes. A record should be kept of the holes shot and of missed holes. The fuse and cap of the latter should be examined for the cause. If the record shows the cause of missed holes to be in imperfect fuse or caps, the lot should be rejected and a fresh lot obtained. There is no economy, and very much danger, involved in the use of explosives that do not surely explode at the first trial.

A NEEDLE of a surveyor's compass that has lost its magnetism may be charged with an ordinary horseshoe magnet, one of 3 inches in length being sufficient. Hold the horseshoe magnet with the poles upward. Pass each pole of the needle from center to extremity over the opposite pole of the magnet, describing before each

pass a circle of diameter about double the length of the needle. Use a rather light pressure. In making the successive passes care should be taken not to return it in a path near the pole. Charging changes the balance of the needle. The balance is adjusted by shifting the brass wire on the south end.

LOSSES by seepage and evaporation from ditches distributing water for mining or irrigation are affected by so many special local circumstances and conditions that any general rule is subject to qualification. Tests made in summer in the Sierra Nevada mountains in California, measuring the water entering the main ditch at its head gate, and measuring the several heads distributed at the outlets, the total length of ditches being about 100 miles, showed an aggregate of losses of 30% of the total. The loss is more in small ditches than in large ones, and more in slow-flowing water than in rapid-flowing. In the tests made the conclusion was that two-thirds of the loss was due to seepage and one-third to evaporation.

A SMALL expense incurred in the surface arrangement of the waste dumps from mines carrying copper with considerable disseminated pyrite may in some cases be made to return a material profit. The waste containing less than 1%, or even as low as one-half of 1%, of copper, if dumped so as to permit free access of air and the convenient collection of water leaching through it, will yield up some of its copper in the form of cement copper. With a large tonnage in dumps a very few pounds of copper yield to a ton will produce a considerable sum. The expense of arrangement of the waste and the provision for precipitating plant should not exceed a few cents per ton, and be well within the minimum returns that can be estimated.

THE determination of the nature of unexpected minerals appearing in making assays is hardly practicable at long range. When such a mineral develops, particularly where it may affect the accuracy of the assay, the first step is to apply the methods of qualitative analysis. Get the mineral into solution by treating with acid, then apply the simple eliminating tests, which in the end will determine it absolutely. The knowledge of qualitative analysis required should be part of the education of an assayer. The black mineral found in with the gold on parting the assay button of rich silver-bearing rock is probably antimony. If the ore originally contained any considerable amount, and any of it was carried on into the button, the parting from the silver would leave it with the gold.

THE Civil Code of California as amended provides that whenever a certificate of stock in a California corporation has been lost or destroyed the owner may bring suit against the corporation to obtain a duplicate certificate. If the stock stands on the company books in some other name than the owner, or it appears that other people have an interest, all such persons are also made defendants. Besides summons as in any civil suit, the clerk of the court must publish a summons in a newspaper in the county at least once a week for four weeks. The court must here evidence and may enter judgment cancelling the lost or destroyed certificate and directing the corporation, on payment of its costs, to issue the duplicate certificate. Actions against the corporation are thereafter forever barred as to the certificate or the shares represented by it.

IN loading holes in mine blasting, particularly the deep holes driven by machines in advancing headings, it is good practice to put a couple of sticks of No. 1 giant into the bottom of the hole, and put the principal charge of No. 2 powder on top of it nearest the collar of the hole. The reason for the practice is the fact that the bottom of the hole, being tightly bound in, escapes the full shattering effect of the explosion if the hole is loaded entirely with No. 2 powder. The collar blows off first and gives the gases from the bottom powder an opening to escape before they have done their work on the rock. With the No. 1 powder at the bottom of the hole, the generation of gas from it in exploding is so much more rapid than from the No. 2 that before the latter blows off the collar of the hole the former has accomplished its full work on the tight rock at the bottom of the hole.

PLACERS yielding fine gold, principally in top wash rather than on or in the bedrock, have the gold associated with clay rather than with the sand or pebbles. Such gold is generally brought to the deposit, by flotation in the stronger stream currents, in periods of flood particularly. In the water, sand becomes more or less "quick." The coherence between the grains diminishes and any fine gold particles in the mass readily slip between them to a more coherent formation beneath. The same is true with gravel. Clay deposited in place by a diminishing velocity of stream flow becomes coherent. Fine gold-reaching clay is held by it, and not until the clay mass is completely dissolved does it give up the gold to the stream current again. Clay works in underneath boulders in the stream beds and is there protected from the disintegrating power of the currents. Fine gold, moving along over the boulders of the bottom of the stream channel, works its way under the boulders and becomes imbedded in the clay next the contact with the under side of the boulder. This peculiarity is observable in drift mines. Next to crevices in the bedrock the place of gold pockets or aggregation are found in the small clay accumulations under large boulders, close to but not on the surface of the bedrock. In pan prospecting the distorting effect on average values of these pockets must be taken into account.







## The Sulphide Ore Problem.

NUMBER II.

Written for the MINING AND SCIENTIFIC PRESS by  
JAS. W. WOHSEY.

We now propose to deal with some of the many proposals made and tried by many clever men to treat this class of ore without any previous separation or dressing by machinery—that is to say, natural ores as mined.

As an expert in smelting, let me say that the trouble smelters experience in the modern lead blast furnace is the accretions the zinc produces all around the sides of this class of furnace and an imperfect settling out of the bullion—lead with silver and gold—from the slag. Reverberatory furnaces are better able to deal with this, owing to the prolonged period in which the melt stands in the furnace; but this is impossible if the zinc exceeds 12%, no matter what flux is used or how much. The presence of zinc in these ores is certainly the cause of all this trouble and loss in smelting, and, therefore, it very naturally occurred to the metallurgist that to extract the zinc from the ore would end the trouble. In 1877 we find E. A. Parnell of Swansea—formerly of St. Helens—took out a patent which had this object in view. He first calcined the ore, then dissolved out the zinc oxide by strong sulphuric acid, afterwards decomposing the zinc sulphate by zinc blende or carbon. The oxide so formed was used in the manufacture of spelter in the ordinary way. The lead residues were smelted in a cupola in the usual manner. This was worked with fair success for several years and was at last given up. The principle here was doubtless a right one at the outset, but the treatment of the extracted zinc was too much to make it a paying success.

Quite a number of experimentalists followed Parnell on the lines he had worked, including the Broken Hill Company, who, I am told, spent a large sum in trying to leach the calcined ore in vats of large size; but this failed, having destroyed all the pipes, taps, and other fittings connecting them.

Peter Spence tried a process based upon the fact that the galena was attacked in preference to the blende by hot hydrochloric acid; but this was of no practical service.

Peter Hart of Manchester, Eng., in 1891, took out a patent in which sulphuric acid was used. The strong sulphuric acid used formed sulphates, and zinc sulphate being soluble in hot water, was easily removable, leaving the insoluble lead sulphate behind. But the strong acid did not dissolve sufficient of the zinc, and, the ore being crushed fine, leaching out the same was impractical.

Fabrik Rhenania, a German chemist, took out an English patent in 1899 on exactly the same lines as Peter Hart and with a like result.

Ryan & Hughes brought forth a process for the extraction of the zinc from ores, or other substances containing same, by means of caustic soda and precipitating same by means of carbonic acid. Nothing seems to have ever come of it, the appliances and reagents being too costly.

Swinbourn & Ashcroft introduced a process in which the lead zinc ores, after being ground finely, were made into a cream with chloride of zinc and sodium or potassium chloride. This cream was put into a converter of special design, and into this at the bottom chlorine gas was forced and heat applied. The chlorine was rapidly absorbed by the metals and sulphur eliminated. Nothing has ever been heard of this. The appliances and cost will, in the writer's opinion, make it prove unremunerative.

S. Gaulin, in 1897, introduced a process which in some respects shows some rather new features and possibilities. He avails himself of the fact that galena introduced into a bath of molten anhydrous zinc chloride results into a double decomposition with the formation of zinc sulphide and lead chloride, any silver present being contained in the lead salt. Metallic zinc added to the melt will result in the formation of argentiferous lead, with the regeneration of a fresh quantity of zinc chloride. This process seems both too complicated and costly.

Gay De Bechi of Paris introduced a process in which the ground ore was mixed with 5% or 10% common salt, roasted in a reverberatory furnace and lixiviating afterwards with water. The solution contained all the metals present as chlorides, which he afterwards separated by fractional precipitation. He is still working on his process in the north of England, but has not published any facts of his working there, so far. But chlorides of the metals are not good salts to work and do not make possible a clean separation of one metal from another.

F. L. Bartlett brought out a process for the volatilization of the lead and zinc as sulphates and oxides suitable for use as a pigment. So far, however, nothing has been heard of the financial success of its working. In the lower Harz a process worked on similar lines was abandoned in the year 1880, some of the chief drawbacks being that a large percentage of the lead was volatilized along with the zinc oxide, carrying along with it a large proportion of the silver, owing to the high temperature required for this

purpose. The fumes collected consisted chiefly of lead and zinc oxides and sulphates, as well as small amounts of silver. By leaching these with sulphuric acid the lead was separated from the zinc, but the zinc sulphate thus formed did not prove to be of much value.

P. Ellerhausen's English patent, in 1897, in several features resembles the Bartlett process, and so far does not seem to answer its designed ends.

Passing by a number of processes of trivial importance, we turn to one by Fry & Everett. This process consists in first grinding the ore, then calcining, afterwards smelting same with a flux consisting of 5 cwt. salt cake and 2½ cwt. of oxide of iron to every 20 cwt. of ore. In their published statement of working they say that they recover about 90% of the lead, all the silver and gold, and that about 90% of the zinc passes into the slag. This latter is mixed with a small quantity of coal and passed into a Siemens gas furnace, where the zinc passes off quickly as rich zinc oxide and is sold for the production of spelter. So far, this sounds well, and would be well if it were true. The directors of this company, who met their shareholders on April 26, say that it is practically impossible to carry on the business, owing to a number of difficulties they experience, and one of these is "losses of metal." I am told by a private source this amounts to nearly the half of their assay value. I have a sample of their zinc oxide and find it contains 6% lead. This, besides losses in their slag and furnace, must have been the cause of the company's downfall. They were never able to properly separate the lead and zinc, and like the works in operation on the Harz, as before named, of which it seems to be a copy, came to a like ending.

(TO BE CONTINUED.)

## Commercial Education for Engineers.

By L. S. RANDOLPH, MEM. AM. SOC. C. E.

In an article on this subject which appeared several years ago the writer said that the value of the engineer was measured by a money standard. Not only does he still hold to that opinion, but subsequent study and observation have more than ever convinced him of the truth of this declaration. If, then, the work of the engineer is measured by a money unit, is it not wise that he himself be taught to measure his work by this most important unit? We teach him to measure small distance to the forty-thousandth of an inch; we teach him to measure the distances of hundreds of miles to the fraction of an inch; we teach him to weigh to the ten-thousandth of a pound, and yet fail to teach him the unit of measure by which alone the world measures him and his work, and upon the results of which measurements his reputation and rewards are based.

Doubt may be raised as to the correctness of the statement that the work of the engineer is measured by a money unit. Let us, therefore, examine this point somewhat more at length. The early engineers built bridges which were considered wonderful if they did not fall down; the first locomotives were considered wonderful if they ran at all. At that time the bare fact of the structure performing the work for which it was intended was the only result demanded. Let us try to imagine how long the locomotive designer would stand to-day who simply turned out a locomotive that would run; or a bridge engineer who would build a bridge whose only good point was that it would carry the load. No clearer proof of this proposition could well be furnished than the results of the competition between British and American bridge works for the Abbara bridge contract in Africa, so much spoken of at the time, several years ago, and a more recent one for a railway viaduct in India. In the former the American-built bridge cost one-third less than the proposed British structure, and was erected in a little over half the time; in the latter case the cost was 43% less, and the work was erected in one-third the time. When we remember that time is money, we can see that in these cases, at least, the sole measure of the capacity of the different engineers was money. It may be urged that this was a business proposition and not an engineering one; that it was due to executive ability and not to engineering skill; but, when we consider that about one-half of the engineering fraternity are in executive positions, and that every detail of the work, from the mining of the ore to the final testing of the bridge, was in the hands of engineers, this argument falls to the ground.

## Precipitating Gold Values in Slimes.

TO THE EDITOR:—Some readers of the MINING AND SCIENTIFIC PRESS will be interested in an invention which has been introduced in a few of Colorado's stamp mills. The process, only lately patented in the United States, is a very simple one. Underneath the pulp, after it leaves the battery, a halogen gas is introduced in such a way that all the pulp becomes impregnated. Through the action of the gas the slimes, which carry away fine values, are disinte-

grated, and the natural result is a precipitation of the values which were floated away. At the same time the halogen gas liberates free oxygen, which cleans the particles of gold which otherwise would not be amenable to amalgamation.

Under the writer's own observation different trial runs were made in H. E. Wood's sampling works at Denver, Colo., with very good results. The increase in the gold amalgamation on the plates varied from 8% to 18%, according to the nature of the ores. The concentrates were also a great deal improved, the silica in some of the ores being reduced from 16% to 8%.

Through the influence of the free oxygen the plate itself is kept in a very fine condition and the quick-silver never gets fouled or floury.

Denver, Colo.

EDW. A. CANE.

## Automatic Sampler, Smuggler Mills, Aspen, Colo.

Written for the MINING AND SCIENTIFIC PRESS by S. I. HALLETT.

In order to make correct or approximately correct samples of ores, it is necessary, before cutting out the sample, to crush the ore to such a degree of fineness as to insure a thorough mixing of the minerals and gangue so that the sample may represent as nearly as possible a true average of the whole lot.

This result is accomplished in sampling works by taking a large sample while the ore is coarse, re-crushing same between the several cuts and so proportioning the cuts as to be in a ratio practically conforming to the fineness to which the crushing is carried, thus with the minimum amount of crushing work securing, in the final cut, a sample sufficiently fine and thoroughly mixed as to truly represent the entire lot.

In concentrating mills, particularly coarse concentrators, it is very seldom possible to get a correct sample at the head of the mill for the reason that the ore is not sufficiently crushed and thoroughly mixed and can not be truly representative in a proportionally small sample that may be cut out previous to its separation by the trommels; therefore calculations based upon laboratory results obtained upon such a sample when computed in connection with the smelter returns may make the mill work appear to vary greatly from the work made apparent from examination of the tailings.

In such cases it would seem to be advantageous to figure backwards in connection with the smelter returns, relying on the thoroughly crushed and well mixed product of the tailings launder to obtain the sample to be used in connection with the smelter returns as a basis of calculation; and, when this is done, it is necessary to have an automatic sampler that may be depended upon to faithfully and correctly cut the stream at regular intervals, and which may be isolated and locked beyond the possibility of interference by meddlesome persons or interested employees.

The drawings shown on opposite page are intended to represent the details of construction of such a sampler now being used very successfully. It was originated by Mr. Cole, the superintendent of the Smuggler mills at Aspen, and is in use there now. There is nothing new about it, unless it may be the use of the friction device for holding the tippie tank in position during the filling of one end of same and in the use of the pneumatic check for controlling the speed of the cutter in passing through the stream of tailings. These, however, have been found to be very valuable features of the machine, as, without the friction device, the machine was found to tip so easily that the interval could not be made long enough without closing the water valve so nearly shut that the stream would be reduced almost to drops, and, when so operated, the valve would continually clog up and stop the operation of the machine. The friction device is adjustable and may be set to hold the tank until the water has filled it very nearly full; thus the interval may be made as long as half an hour with the valve open so as to deliver a stream as large as a quarter of an inch in diameter. But when the tank is released with such a large quantity of water to overbalance it, it was found to fall so quickly as to pass the cutter through the stream with such speed as to defeat the object of the machine.

In order to control the velocity of the cutter when passing through the stream, the pneumatic check was designed and applied. It is simply a well-joined square box, open in the middle and closed at each end, forming comparatively air-tight recesses in which wooden pistons work. These pistons are so fitted as to work smoothly and easily and are not packed in any way. They are connected together by a wooden rod, which is actuated by the cutter lever. The piston boxes are penetrated at their outer extremities by a 1½-inch hole, covered by a controlling button, which latter is adjusted in making the speed of the cutter as the operator may choose.

In operation, this pneumatic check offers no resistance to the starting of the lever, but it immediately begins to operate when it has begun to move, and, by means of the buttons, may be made to take the time in passage that experience may demonstrate as best.



Electric Hoists on the Comstock.\*

By LEON M. HALL.

With the advent of electricity on the Comstock it became necessary to take up the problem of hoisting from considerable depths by means of electrical energy, and after much research and a thorough investigation of the then existing electrical hoisting machinery it was evident that, in order to meet our conditions of service and power, we must procure something radically different from the usual run of such machinery. The writer, then, after discussing the matter with the Risdon Iron Works of San Francisco, decided on the system as explained in this article, the ultimate result being the development, installation and operation of a continuous rope electric hoist, driven by means of a variable speed, three-phase induction motor.

The power for the Comstock is developed on the Truckee river at a point near Floriston, 33 miles from the mines in Storey county, Nevada.

The generating station is equipped with two 750 K.W., 3-phase, 60-cycle Westinghouse generators, and six 300 K.W. oil-cooled transformers. McCormic turbines are used to drive the generators and a close regulation is secured by means of Lombard governors. At the station the potential is raised from 400 volts to 24,000 volts, at which pressure it is transmitted over a double circuit of No. 4 hard-drawn copper wire. At the sub-station in Virginia City the potential is reduced to 2300 volts, and in this form is distributed to the various mining companies. In the case of each hoist but one—namely, that at the C. & C. shaft—it is again reduced to about 450 volts.

The power is purchased from the Truckee River General Electric Co. upon a continuous rate basis, the amount being fixed by a peak load of two minutes' duration.

Under these conditions it has, therefore, been the endeavor of the mining companies to secure a hoist that will operate at the highest possible efficiency and at the same time effect the regulation of the system to as slight a degree as is consistent with good service.

To meet the condition of high efficiency it is evident that the motor should operate continuously at or near its full load capacity, and be designed especially for the work it has to perform. For a continuous full load condition, the work must of necessity be constant at all points in the lift, and the nearest possible approach to this was secured by the adoption of the continuous rope or balanced system, where the load is reduced to the weight of the rock alone. Then, to secure the necessary variations in speed, an induction motor with a non-induction resistance in both primary and secondary was developed, the resistance being varied by the introduction of a modified form of the ordinary street car controller. With an equipment of this kind the cages are started slowly and the dip in line voltage is comparatively slight, being about 7% at starting. By running on the second notch of the controller one-third of the maximum speed may be maintained for the full length of the shaft.

The hoist itself consists essentially of a main driving drum and an idler, around which the rope is wrapped four times in order to secure the necessary friction for lifting. From the main driving drum the rope is carried over the head sheave, down one compartment, under a movable tail sheave, back the second compartment, over a second head sheave, and on to the driving drum. One cage is inserted between the ends of the cable and the other fastened by means of heavy iron clamps, one above and one below the cage in the adjacent compartment. This simple arrange-

ment enables us to vary the relative position of the cages at pleasure, and also permits us to use one cage in a single compartment without reference to the other.

The hoist is necessarily a geared machine, the motor speed being reduced by the introduction of cut gearing. To the main drum is attached a brake ring, upon which is operated a heavy post brake. This brake is set automatically by means of a heavy weight and is released by hydraulic pressure. In the case of the Yellow Jacket and Belcher there are two hoists, side by side, both being operated by one motor. One of these is intended for the vertical shaft and the other for the incline, which leave the vertical at the point where the vein intersects it. Double-deck cages are used in each compartment of the vertical shafts and a two-ton self-dumping giraffe in each compartment of the inclines.

The hoists have been erected in the most substantial manner, upon concrete foundations, and there is practically no vibration and very little noise.

The table below gives complete data upon each of four installations.

In each of the foregoing the continuous rope or balanced system has been adopted and the actual load lifted amounts to the weight of the rock alone, plus the friction losses. The load is constant at all points in the lift and the strain upon the mechanism equalized at all times, except when starting and stopping.

The Yellow Jacket hoist was a success from the start and was operated for more than a month with single cage in one compartment. This is the severest test to which the hoist can be subjected, and under these conditions the performance is as near perfection as any hoist I have ever seen. Tests were made during this time and the following are the results:

Weight of cage, 1200 pounds; weight of car, 850 pounds; weight of rock, 1600 pounds; total weight lifted, 3650 pounds.

Maximum rope speed, 600 feet per minute.

Length of vertical lift, 1175 feet.

Time of hoisting, two minutes and ten seconds from the moment the load was started until the cage was landed on chairs at the surface.

Time to accelerate load, eight seconds.

Power required as per watt meter reading, 88.40 H. P.

Theoretical power required, 66.40 H. P.

Efficiency of the system is, therefore, about 75%, and this includes motor efficiency and all friction losses from secondary transformers.

Secondary voltage was 525 volts before starting and the running voltage slightly over 500.

The maximum current per phase at starting was 180 amperes and 85 amperes when operating at full load.

A reading was also taken while lifting the empty cage at 600 feet per minute, and the watt meter showed 48 H. P.

It will, therefore, be seen that the results obtained are remarkably good, and no trouble should be experienced with a hoist of this character upon any well-regulated plant. I will add that the successful operation of this hoist is a decided advance in mine hoisting—not alone in the high efficiency secured, but also in the large capacity as compared with the size of the motor in use. Of course, there are cases to which this system is not adapted, but wherever it is applicable it is certainly worthy of serious consideration, where economical operation is a feature of the development. All four of the above hoists were built by the Risdon Iron Works of San Francisco. The cut attached is from the experimental model submitted to the writer. All four hoists are built so that the speed can be doubled, using two motors instead of one. This would give twice the capacity named in table.

Calkins' Umpire Ore Sampler.

The Umpire ore sampler, so its manufacturers claim, will quickly and correctly sample ore in quantities from 1 to 100 pounds. As shown in the sectional view, both buckets are divided into quarters; two of the divisions in each are closed,



and two open; therefore, if sixteen pounds of ore is placed in the hopper and the machine operated, eight pounds remain in the upper bucket, four pounds in the lower and four pounds, or one-quarter of the entire amount, passes into the receptacle at the bottom. By feeding the four pounds obtained by the first operation, a one-pound sample would result, or one-sixteenth of the whole; a third feeding would obtain one-sixty-fourth, and a fourth, one-two-hundred-and-fifty-sixth of the original sample. F. W. Braun & Co., of Los Angeles, Cal., are the manufacturers.

The patent specifications of the Edison storage battery all show the great amount of work, and thorough investigation of obscure and delicate differences of chemical reactions and of electrical behavior, on which the invention is based. To prepare the iron cell, monosulphide of iron was first crushed to 200-mesh size. Eight parts of this by weight were next mixed with about two parts of flake or mica graphite of a size considerably larger than the perforations in walls of the cell pockets. The mixture was then moistened with a 20% solution of potassic hydroxide and packed in the pockets by a tamping tool. The graphite not being flexible, the mixture packs to a hard, porous mass, which is not disintegrated by gas formation. After packing the pockets almost to the top, a wad of asbestos fiber of about 1/4-inch thickness is put in the pocket. On top of the packing a sheet of perforated nickel is fastened by wires. The element is then oxidized electrolytically in a solution of potassium hydroxide. Sulphur is disengaged and forms soluble sulphide of potassium, which diffuses out the mass while ferrous oxide is formed in the cell. The oxide is more bulky than the sulphide and produces pressure on the cell walls, which retains the cell filling from disturbance in place. The use of the monosulphide results in securing the largest possible quantity of oxide in the smallest space. Many tests of other methods of formation were made, but only the method described gave an effective result. In the form obtained, the oxide was reduced to iron, electrolytically completing the cell. Chemical differences detailed by the inventor, though not always explained or explainable, show that other methods or starting points do not bring the desired result. The oxygen-storing element, which it is declared can be either nickel or cobalt—nickel being the cheapest, and therefore employed—is prepared by precipitating the monoxide or black hydrated dioxide in the usual commercial way, purifying and drying it, and finally pulverizing it. Seven parts by weight of this and three parts by weight of the mica graphite are mixed and moistened and the pockets filled and enclosed, as described above. The plates are then electrolytically treated in a solution of potassium hydroxide with an oxidizing current for a considerable time, the oxidation of the nickel being either raised to a higher stage of oxidation than the black oxide  $Ne_2O_3$ , or the excess oxygen being absorbed in some undiscovered form. The special features are permanence and indestructibility by use, and the superior selective applicability of the several materials employed. The ingredients are all insoluble. The supporting plates are unaffected by the materials or the electrical reactions during use.

\*See illustration on front page.

| KIND OF HOIST.                          | Yellow Jacket<br>G. & S. M. Co.                        | Belcher Silver<br>M. Co.              | Union Shaft<br>Co.                                    | Con. Cal. & Va.<br>M. Co.              |
|-----------------------------------------|--------------------------------------------------------|---------------------------------------|-------------------------------------------------------|----------------------------------------|
|                                         | Double continuous rope hoist for<br>four compartments. |                                       | Single continuous rope hoist for<br>two compartments. |                                        |
| Daily capacity from bottom.....         | 500 tons.                                              | 500 tons.                             | 500 tons.                                             | 600 tons.                              |
| Make of motor.....                      | Gen. Electric.                                         | Gen. Electric.                        | Gen. Electric.                                        | Westinghouse.                          |
| Type of motor.....                      | 7200 alter'at'ns.<br>M. 440 volts.                     | M. 7200 alterna-<br>tions, 440 volts. | M. 7200 alterna-<br>tions, 440 volts.                 | F. 7200 alterna-<br>tions, 2240 volts. |
| Size of motor.....                      | 75 H. P.                                               | 75 H. P.                              | 100 H. P.                                             | 200 H. P.                              |
| Speed of motor.....                     | 450 R. P. M.                                           | 450 R. P. M.                          | 450 R. P. M.                                          | 550 R. P. M.                           |
| Weight of rock.....                     | 3,200 lbs.                                             | 3,200 lbs.                            | 3,200 lbs.                                            | 3,760 lbs.                             |
| Weight of double-deck cage.....         | 2,200 lbs.                                             | 2,200 lbs.                            | 2,100 lbs.                                            | 2,951 lbs.                             |
| Weight of two cars (maximum).....       | 1,700 lbs.                                             | 1,700 lbs.                            | 1,700 lbs.                                            | 1,730 lbs.                             |
| Weight of rope in each shaft.....       | 1,896 lbs.                                             | 1,390 lbs.                            | 2,528 lbs.                                            | 5,000 lbs.                             |
| Weight of total load raised.....        | 8,996 lbs.                                             | 8,490 lbs.                            | 9,528 lbs.                                            | 13,441 lbs.                            |
| Weight of unbalanced load.....          | 3,200 lbs.                                             | 3,200 lbs.                            | 3,200 lbs.                                            | 3,760 lbs.                             |
| Diameter plow steel rope used.....      | 1 in.                                                  | 1 in.                                 | 1 in.                                                 | 1 1/4 in.                              |
| Weight of rope per foot.....            | 1.58 lbs.                                              | 1.58 lbs.                             | 1.58 lbs.                                             | 2 lbs.                                 |
| Distance load to be hoisted.....        | 1,175 ft.                                              | 850 ft.                               | 1,550 ft.                                             | 2,500 ft.                              |
| Maximum rope speed per minute.....      | 600 ft.                                                | 600 ft.                               | 750 ft.                                               | 1,250 ft.                              |
| Weight of incline car.....              | 2,000 lbs.                                             | 2,000 lbs.                            | .....                                                 | .....                                  |
| Weight of rock.....                     | 4,000 lbs.                                             | 4,000 lbs.                            | .....                                                 | .....                                  |
| Length of incline rope from sheave..... | 1,500 ft.                                              | 1,350 lbs.                            | .....                                                 | .....                                  |
| Size of incline rope.....               | 1 in.                                                  | .....                                 | No inclines.                                          | No inclines.                           |
| Length of incline.....                  | 400 ft.                                                | 550 ft.                               | .....                                                 | .....                                  |
| Size of each compartment.....           | 5 ft. x 7 ft.                                          | 5 ft. x 7 ft.                         | .....                                                 | .....                                  |
| Unbalanced load of incline.....         | 4,000 lbs.                                             | 4,000 lbs.                            | .....                                                 | .....                                  |
| Maximum rope speed per minute.....      | 600 ft.                                                | 500 ft.                               | .....                                                 | .....                                  |
| Angle of inclination.....               | 45°                                                    | 36°                                   | .....                                                 | .....                                  |

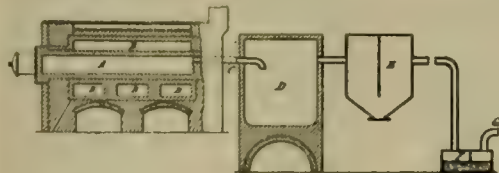


## Mining and Metallurgical Patents.

Patents Issued July 30, 1901.

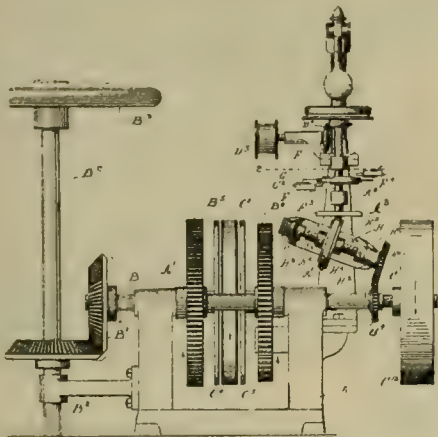
Specially Prepared for the MINING AND SCIENTIFIC PRESS

PROCESS OF EXTRACTING ARSENIC, ANTIMONY OR TELLURIUM FROM SULPHUROUS ORES.—No. 679,330; E. Petersson, Brussels, Belgium.



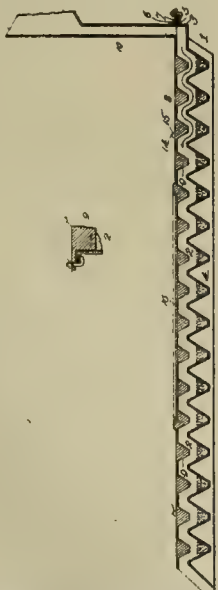
A process for the removal of antimony and tellurium from sulphurous ores containing also arsenic, by direct volatilization, consisting in admixing the ore in a powdered state with powdered carbonaceous material, heating mixture while protected from atmosphere to a temperature sufficient to volatilize any arsenic present as arsenious and arsenic sulphide, and further heating to a higher temperature to volatilize antimony as antimonious sulphide and also drive off tellurium, but not to temperature sufficient to effect a substantial reduction of remaining sulphides.

GOVERNOR FOR WATER WHEELS.—No. 679,353; E. E. Woodward, Rockford, Ill.



A speed regulator; a friction-disk shaft; two friction disks loosely mounted on shaft; a friction wheel fixed on shaft between friction disks; a gate operating shaft; a rotatable connection between one friction disk and gate-operating shaft, to rotate shaft in one direction; a rotatable connection between the other friction disk and gate-operating shaft, to rotate shaft in contrary direction; tappet arms for moving friction-disk shaft to throw the friction wheel into engagement with either friction disk; a cam for engaging tappet arms; a shaft for cam; a friction disk on shaft; a friction wheel having contact with friction disk; an inclined screw-threaded shaft for friction wheel, and means for rotating screw-threaded shaft when the power valve is operated, to raise or lower cam from engagement with tappet arms.

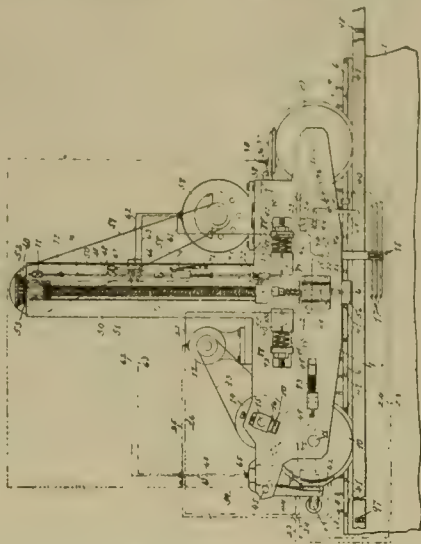
AMALGAMATOR.—No. 679,355; J. H. Barr, Kansas City, Kans.



A pan having a series of V-shaped pockets to contain mercury, and a cover for pan provided with V-shaped baffle plates adapted to depend centrally

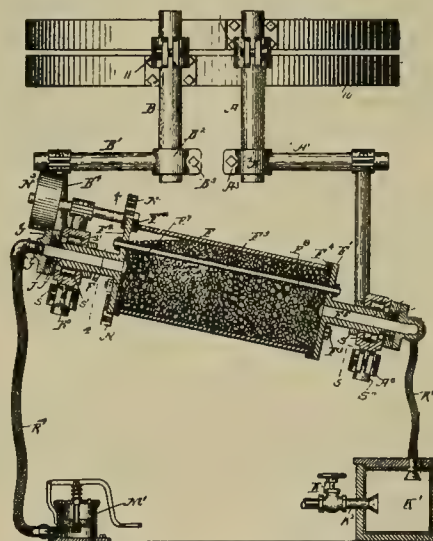
over pockets, the two forming a vertically-tortuous passage whose cross area is greater in vertical planes intercepting baffle plates whereby passage may be made of uniform cross section by provision of liquid mercury in pockets.

APPARATUS FOR TREATING METALS BY ELECTROLYSIS.—No. 679,357; A. G. Betts, Upper Troy, N. Y.



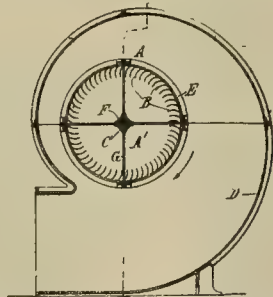
An electrolytic vat and electrodes; track adjacent to vat; a carriage on track; a reversible motor for moving carriage; an automatic switch for reversing motor at either end of path of movement of carriage; means for automatically causing motor to operate intermittently to move carriage in one direction; electrode raising and lowering mechanism on carriage; means for automatically operating electrode raising and lowering mechanism during intervals between successive intermittent movements of carriage, and a pair of pressure rollers mounted on carriage in the path of raised and lowered electrodes.

ORE ROASTING AND DISTILLING APPARATUS.—No. 679,452; G. D. Burton, Boston, Mass.



A rotary furnace provided with hollow electrically conductive axles and with interior heating rods in electric connection with hollow axles, means connected with hollow axles for passing an electric heating current through axles and rods, a pipe connected with one of axles and provided with branches, receivers connected with branches for collecting by-products, and an exhausting device connected with receivers.

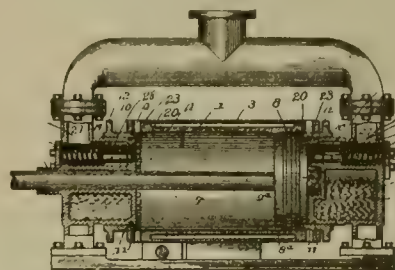
ROTARY FAN AND PUMP.—No. 679,499; S. C. Davidson, Belfast, Ireland.



A rotary member having numerous elongated blades arranged lengthwise in approximately axial direction, and in drum form, so as to inclose within

them a relatively large and practically unobstructed intake chamber, and in transverse section arranged, relatively to the axis and direction of rotation, to carry fluid with them rotatively and discharge it tangentially, rotary member being open at both ends so that fluid operated on may be taken in axially through both ends thereof, and having a hub, annular supports engaging outer edges of blades and adjustable stays connecting supports with hub, and means for so mounting rotary member as to permit tangential escape of fluid discharged from blades.

AIR COMPRESSOR.—No. 679,335; D. Pryde and H. Guerman, Braddock, Pa.



A cylinder having a stationary body and heads, body being provided with an annular row of air-inlet ports at each end, of piston in cylinder, of rings movable over heads and projecting into body, and means for moving rings to alternately cover and uncover ports.

## Cooling Water by Compressed Air.

TO THE EDITOR:—Cooling water by means of compressed air is an easy matter. The cold, expanded air should only be led through a pipe or coil of pipe dipped into the water to be cooled, and then exhausted into the atmosphere.

The writer can recall a fact of personal experience, when in charge of some tunnel work. A ventilator fan blowing fresh air to the front was actuated by a small steam engine working with compressed air, the exhaust of which was led into a closed chest containing tin tumblers filled with water. On its way to the discharge orifice the current of escaping air was passing along the row of tumblers, and some ten to fifteen pounds of ice were thus daily made quite readily. The miners felt interested in the progress of the refrigeration, and the men of the outgoing shift would seldom fail to dip a dusty finger into some of the tumblers, whose main peculiarity was the existence of a black core at the center of the block of ice. When air at a given pressure and temperature is allowed to expand adiabatically to say atmospheric pressure, there is no theoretical difference between the volumes of the air, and consequently its temperature, at the moment when the lower pressure is reached. In practice the results are quite at variance.

The air which has done expansive work behind a piston moving in a cylinder escapes at a low temperature and at a moderate speed, and is fit for use as a refrigerating agent. Such is the principle applied in the Bell, Coleman and Allen air engines.

In the air which is simply released through a valve the whole expansive work is converted into velocity, and almost instantaneously transformed into heat, by friction with the surrounding atmosphere or against the neighboring bodies. The result is that no cold can practically be produced in this manner.

Besides, the use of an expansion cylinder coupled to the compressing cylinder reduces to a minimum the actual amount of work required by this process of refrigeration. Its efficiency is low, and it is not economical on a large scale as compared with the ammonia process; but it possesses advantages of simplicity, of cheapness and of safety, which in many cases will make it quite valuable.

San Francisco, Cal., Aug. 8.

A. E. CHODZKO.

W. A. R. LOOSE, of Provo, Utah, so the Salt Lake City, Utah, Tribune says, is the inventor of a novel method of reduction for certain copper ores which he recently tested successfully before a number of interested mine owners. In the process, carbonates of copper, occurring in the form of malachite, azurite, etc., are first reduced to metallic copper, after which the metal is separated from the gangue. In the process the crude ores are crushed to an eight-mesh, mixed with a small percentage of powdered charcoal and dumped into a hopper. From this it is passed into revolving wrought-iron tubes and is subjected to a temperature of 1800°. From these tubes the ores pass by gravity into a tank of cold water, the bath to which they are subjected protecting the ores from reoxidation by contact with the air and releasing the metal in the disintegration of the siliceous gangue. The product discharged from the bath contains the metallic copper in shot-like particles in blackened silica. After screening through a sixty-mesh it is passed over tables by which the particles of bright copper are separated from the gangue, collected, and are then ready for refining.



## MINING SUMMARY.

Specially compiled and reported for the  
MINING AND SCIENTIFIC PRESS.

### ALASKA.

#### JUNEAU.

The work in the Last Chance G. M. Co. tunnel and shaft, near Juneau, is completed. The tunnel is in over 2000 feet. The 2000-foot pipe line is laid from the flume to the head of the tunnel shaft and hydraulicking has been commenced.

President A. Raymer of the Windham Chief G. M. Co. is starting development work on the mine at Windham Bay.

For the month ending July 15th the Alaska Mexican M. Co. reports 14,894 tons ore crushed, yielding \$13,747 and 235 tons sulphurets, valued at \$5666. The gross yield was \$21,197 and the working expenses were \$20,039. Ore averaged \$1.42 per ton.

The Alaska United mine crushed 28,024 tons ore for the month ending July 15th, valued at \$29,740, and 520 tons sulphurets, valued at \$12,624; gross yield, \$46,305; working expenses, \$36,999; average value of ore, \$1.65 per ton.

### ARIZONA.

#### COCHISE COUNTY.

The new four-compartment shaft at Tombstone is now down 250 feet. One drift run at the 100-foot level was run and connection made with old workings on the Contention. Another drift is being started at the 250-foot level to make air connections with the old works. The shaft is now about half way to water level.

#### COCONINO COUNTY.

The Ridenour copper mines at Pine Springs have been bought by A. Boren, representing Pittsburg, Pa., people, for \$50,000.

#### GRAHAM COUNTY.

The Copper Matte M. & M. Co. has incorporated, capital \$500,000. The principal office will be at Tucson. The mines are in the Greenlee district, near Clifton. E. E. Frye, W. M. Griffith and B. F. Jossey are the incorporators. Contracts for development work have been let to P. F. Crowley of Tucson, who has already commenced work. One tunnel is now in 230 feet and has cut a large body of sulphide ore.

#### MARICOPA COUNTY.

A proposition for the establishment of a custom smelter in Phoenix is being promoted by J. S. Loder of Denver, Colo., who is seeking to enlist local capital.

The Relief G. M. Co., capital \$200,000, is being incorporated at Phoenix to operate the Relief mine, located 20 miles northwest of Phoenix; the incorporators are G. Hamlin and G. A. Treadwell of Phoenix and S. S. Morse of New York. The company propose to begin immediately on development work and the installation of machinery. It is expected that twenty stamps will be put in.

#### PINAL COUNTY.

(Special Correspondence).—The Arizona Copper Hill M. Co., with principal office in Denver, Colo., are considering the matter of erecting a leaching plant on their property near here. Recent development has disclosed bodies of copper ore that it is thought can be profitably treated. Oracle, Aug. 3.

#### YAVAPAI COUNTY.

A New York company is reported as having bonded the Bullard mines, 50 miles west of Congress, at \$500,000, paying some cash down to J. Bullard of Congress, the owner. The mine is a copper-gold proposition.

The Baumann Copper Co. has been incorporated at Prescott, capital \$600,000, to work the Baumann group of mines at Agua Fria. There are twenty-five claims included in the property. H. P. Anewalt is president, J. Baumann secretary and general manager and W. S. Goldsworthy treasurer, with office at Prescott.

#### YUMA COUNTY.

G. W. Upton, said to be representing Clinton, Ia., capitalists, has made considerable development of the Gold King and Mountain Ridge mines, near Octave. One tunnel is in 900 feet and has shown up considerable ore.

### CALIFORNIA.

#### CALAVERAS COUNTY.

The Deep Gulch quartz mine at Mokelumne Hill, owned by Nunes & Kiser, has been bought by a company represented by D. Balch of San Francisco, who is now operating it.

W. H. Clary of the Commodore mine, near Mokelumne Hill, says the final payment has been made on the bond and the title passed. Work on the mine will soon be resumed. It is probable that a mill will be put up.

### EL DORADO COUNTY.

G. E. Lukens of Auburn, Cal., and E. Dubois of Redding, Cal., have bought the Wilhelm quartz mine, near Centerville, from Koeckel Bros. The new owners will begin development in a short time.

W. B. Barstow of Manila, Iowa, and F. B. Thomas of Montana have recently bought an interest in the Josephine mine at Volcanoville. Work is being done in the lower tunnel under the management of J. M. Nougues Jr.

The Union Con. G. M. Co. has incorporated, capital \$10,000, to operate a mine near Georgetown. J. H. Morton of Georgetown is one of the incorporators.

### GLENN COUNTY.

F. W. Eaton, owner of the Lion copper mine, located near Stonyford, has leased it to a syndicate. This mine was located and incorporated on June 15, 1867, with a capital stock of \$108,000, but has been closed since. The mine will be operated and machinery put on.

### NEVADA COUNTY.

The clearing out of the old 600-foot shaft of the California mine at Grass Valley has been commenced, under the management of Supt. Lawrence. The company will erect a hoisting plant.

The Grass Valley Exploration Co. have commenced cleaning out and sinking the shaft on the Crescent mine, which is not involved in the pending litigation. In the early days the Crescent produced some good rock, and the shaft was sunk only to a depth of 200 feet. The machinery now on the Telegraph mine will be removed to the Crescent.

### PLACER COUNTY.

The Black Canyon M. Co. are placing some hoisting works at their quartz mine above Westville. The tunnel is in on the ledge 400 feet. An upraise of 180 feet has been made and a shaft will be sunk in on the main tunnel.

The development of the Azalea mine at Blue Canyon was resumed on the 1st. A. Rogers is Supt.

### PLUMAS COUNTY.

A. E. Murdock, superintendent of Last Chance mine, reports eight men at work in the mine. The incline is down over 150 feet on the ledge. There is 7 feet of ore in the heading, carrying gold, silver, copper and lead to value running from \$40 to \$103 per ton. A meeting of the directors of the Last Chance G. & S. M. Co. has been held at Reno, Nev., and the proposition to erect a smelter considered. The mine is located within 6 miles of the main line of the N. C. O. and 7 miles from the Sierra Valley branch, connected with both lines by good roads.

### SAN DIEGO COUNTY.

At the California Gold King mine, near Yuma, the owners are preparing to spend a large sum in improvements, says S. W. Dorsey. All the material for a 1000-ton cyanide plant and for 5 miles of railroad is on hand. The company owns twenty-four claims, a free milling proposition. The ore assays \$3 to the ton.

Receiver C. W. Pauly of the Golden Cross mines in his June report shows receipts \$28,196.73 and expenditures \$20,024.22. The value of the bullion produced by the stamp mill during the run from May 6 to June 7 was \$15,042.54, the returns from the cyanide plant \$11,992.09, and from other sources \$1162.10. The expenditures included, among other items: For labor, \$7398.49; freight, \$1229.05; fuel, \$663.15; merchandise and supplies, \$9596.12. The report also includes a statement of the development work, showing that 345 feet of drift and winze had been made during the month. The estimated cost of sinking the shaft in the Cross mine and the winze in the Crown was about \$5 per foot, and the drifting in the Cross and the Queen about \$4 per foot.

### SHASTA COUNTY.

J. H. Roberts of Sacramento, L. A. McIntosh of Chico and I. O. Jillson of Hornbrook, Siskiyou county, have recently bought from J. H. Walkotte the Gladstone mine near French Gulch, together with the improvements, for \$7500. In the course of the old operation of the mine a drift was started which was expected to tap the pay shoot at a depth of 800 feet. The tunnel was run for a distance of 2500 feet at a cost of \$25,000, and then work was stopped. The buyers undertook to do a little development work and began extending the lower drift. After running 70 feet they cut the ore body. The ledge is 8 feet wide and the pay shoot is over 80 feet long. It is believed that the ore will average \$15 per ton. Ten stamps are in operation, and preparations are being made to start the other ten stamps.

The mill at the American mine, at French Gulch, has been shut down for the season. Development work will be continued in the mine. A new drift is being run on the ore body. T. Irvin is Supt.

The townsite of Saltee, near the Bully Hill smelter, has been sold by Honn,

Moore & Arnold to J. M. Say of Los Angeles. Four copper claims near Saltee—the Honn, Moore, Arnold and Last Chance—are included in the sale. An official plat of the townsite will be made and lots sold. It is proposed to develop the claims.

### SIERRA COUNTY.

A fine body of ore has been struck in the upper tunnel of the Oakland mine, near Gold Lake, above Sierra City. With the completion of the lower tunnel the mine will be well opened. V. C. Julian of Oakland, Cal., is the owner.

### SISKIYOU COUNTY.

J. W. Conant of Callahan's has struck on Scott mountain a large vein of ore that he claims will mill \$15 a ton. The ledge is about 11 feet in width. He expects to put in machinery and a mill before spring.

It is said that the main vein of the Jillson mine, near Henley, has been struck again, and that operations on a large scale will be resumed in October.

H. Mattern, who has been operating near Henley, is reported to have made a good strike. His ledge adjoins the Jillson, and a 2-foot vein of ore that yields from \$50 to \$75 a ton has been uncovered for a considerable distance.

The Wabasha mine, near Coles, owned by H. Mattern of Ashland, Or., and Bennett & Reynolds of Minnesota, is reported to be developing favorably. A 3-foot vein that goes over \$40 to the ton has been struck.

### TUOLUMNE COUNTY.

The Gold Ridge M. & M. Co. has incorporated; principal office, Tucson, Ariz., and branch office, Sonora, Cal. The directors are C. G. Bacon, J. Monahan, E. Twist, W. Jones and E. A. Jones; capital stock, \$500,000.

### COLORADO.

#### BOULDER COUNTY.

The old Livingstone mine, near Wall Street, has been bought by the Tambourine Co. New machinery is being ordered and the shaft will be sunk 500 feet deeper.

#### CHAFFEE COUNTY.

The Latchaw M. T. & M. Co., at Buena Vista, C. M. Sharpe Supt., has been in operation several months and has put in considerable machinery and other improvements.

#### CLEAR CREEK COUNTY.

Fogg & Brown of Boston, Mass., will install a new machinery plant in their mine, near Idaho Springs. They expect to sink the shaft 250 feet deeper.

The Sporting Times group, near Georgetown, has been bought by the Sporting Times G. M. & M. Co.; W. H. Smith of Des Moines, Iowa, president and F. L. Schrott of Denver, manager at Georgetown. A 500-foot contract will be let to drive a new level under the pocket of ore taken out in the old workings.

The new fifty-ton concentrating mill of the Red Oak Co. at Georgetown has been started. The company have a streak of solid lead ore in the mine 6 feet wide and a large body of concentrating ore in connection with it.

L. Bisna & Co. shipped eleven tons from the Dunderberg mine, at Silver Plume, which milled at the sampling works 1022 ounces silver for first class and 254 ounces silver per ton third class, netting the lessees, after paying all expenses, \$1260.

The Brazil mine, near Freeland, owned by Morgan & Kennedy, has shut down. The development work upon this property, while it produced considerable ore, has shown that it will be necessary to put machinery upon the property.

### DOLORES COUNTY.

The Mt. Gorum Co. at Rico is upraising from the Smuggler tunnel for air. It is estimated that ore taken out from the raise will pay its cost. The company has bought more territory and now owns thirty-eight claims.

### FREMONT COUNTY.

The Nipple Mountain Tunnel Co., composed of Florence and Canyon City people, has a tunnel in about 300 feet on its claim at Wilbur. Assays recently made show \$16.40 per ton gold.

### GILPIN COUNTY.

A rich strike of silver ore has been made in the Klondike tunnel, near Black Hawk, owned by C. Feissner. The tunnel is now in 120 feet.

### GUNNISON COUNTY.

A. N. Perreault and W. N. Jones are developing the Deacon lode at Tin Cup. They shipped three cars of ore which netted \$50 per ton—\$30 in gold, 12% lead and the remainder in silver.

It is stated that a strike has been made in the Hard Cash group, near Marble. In driving the tunnel, now in about 200 feet, a 4-foot vein of ore was cut, which carries copper, silver and gold. It is understood the ore shows assay values of from 6% to 10% in copper, 50 to 150 ounces in silver and \$4 per ton in gold. The property is

owned by the Sulphide Copper Co. of Denver.

The Headlight G. M. & M. Co. has started work on its Spencer claims at Gunnison. Development work is being done with a view to selecting a site for the machinery. Six shafts have been sunk. L. C. Eberling is manager.

### JEFFERSON COUNTY.

The new pyritic smelter at Golden, lately started up, is claimed to be operating successfully. Dr. Carpenter, the builder and manager of the new plant, says the smelter has one blast furnace in operation at present, working at about one-third capacity. This is gradually being increased to full capacity, about 300 tons of ore daily. The foundations are in for two more furnaces, which will be added soon. The plant is now treating ore which runs about \$7 per ton with a fair profit. About 100 men are employed.

### LAKE COUNTY.

Some Leadville people have taken a lease on the Mammoth M. & M. Co.'s mine at Twin Lakes. The intention is to prospect on a vein opened up by the old shaft and later on sink the shaft.

S. E. Smith of Denver has made a rich mineral discovery near Twin Lakes in the Silver Serpent and Rattler claims. The lead is a vein of black manganese and hematite. Assays show 152 ounces silver, \$5 gold and 17% lead to the ton. Arrangements are being made for extensive development.

The Shumache property, in Echo canyon, owned by D. K. Orner of Twin Lakes, T. H. Warner of Salt Lake City, Utah, and M. M. Warner of Bloomington, Ill., has been leased to M. Orner of Twin Lakes, J. Schitzius and E. Stevens of Pueblo, who have also leased the Thomas mill.

A. D. McRay, manager of the La Plata G. M. & M. Co., says he has a 10-inch streak on the Mountain Quail which shows an average value of \$400 per ton.

### MINERAL COUNTY.

During July the mines of Creede shipped 408 cars of ore, or 7541 tons. The Batchelor shaft on "G" lease is being sunk by contract. The bids for 100 feet of sinking ranged between \$34 and \$45 per foot. The contractors on the Sunnyside Dev. Co.'s mine struck ore in the breast of the tunnel, which is now 750 feet in. The operators are troubled with bad air.

### OURAY COUNTY.

The Humboldt mine at Ouray is being operated by J. McMahon, former manager of the Wedge mine, under lease and bond from J. B. Farrish of Denver, owner of the Wedge.

T. J. Maloney has bought for himself and other Denver people eight claims in the Sneffels district, near Ouray, from the estate of J. Sullivan, for \$50,000.

T. J. Maloney of Denver has bought a group of properties in the Sneffels district near Ouray for \$20,000. The claims included are the Terrible No. 2, the Zigzag and the Clipper No. 2. A long tunnel is projected through these properties, in the course of which some large veins are expected to be cut.

### SAN JUAN COUNTY.

The Minnie Gulch M. & T. Co., Silverton, it is reported, will erect a large concentrating mill for the treatment of ores from the Tom Moore and Copper King mines. A gravity tramway of three-fourths of a mile will be required. It is calculated to continue the lower Copper King tunnel to a length of 4000 feet. The tramway from the Moore will end at the ore discharge of the Copper King tunnel, where the ores of both groups will be concentrated.

The Broadgauge mining property, located in Burns gulch, near Silverton, has been leased to J. H. Ryan of Red Mountain, who will commence development on it at once. The Broadgauge is one of the oldest locations in the county.

### SAN MIGUEL COUNTY.

The Alta Vista Co., at Telluride, has made the second payment of \$30,000 on the purchase of the Alta. The company is engaged in changing the equipment of the Bessie 200-ton mill from a cyanide to a concentration system, and expects to complete the work and have the mill running by Sept. 1. The 700-foot tramway required to complete the connection between the mill and the Alta workings is under construction.

### SUMMIT COUNTY.

It is reported that the Boss and Thunderbolt silver mines at Breckenridge have been bought by F. C. Goff of Denver. During the '80s this property produced about \$200,000 of silver.

### TELLER COUNTY.

The Legal Tender shaft has been timbered down about 650 feet. As a precaution against fire, 20 feet of masonry will be added to the top of the shaft and the top will be covered with iron doors. A



tunnel will be driven a few feet below the surface for exit in case of fire, and this entrance will also have iron doors. Much the same plan of construction will be followed in alterations to be made at the No. 1 shaft of the Vindicator.

The following is the list of dividends paid by Cripple Creek companies in July:

|                          |              |
|--------------------------|--------------|
| Mary McKinney .....      | \$ 60,000 00 |
| Portland .....           | 180,000 00   |
| Gold King .....          | 28,105 50    |
| Modoc .....              | 5,000 00     |
| Vindicator .....         | 55,000 00    |
| Gold Coin .....          | 30,000 00    |
| Consolidated Mines ..... | 19,000 00    |
| New Zealand .....        | 7,650 00     |
| Doctor .....             | 29,000 00    |
| Nugget .....             | 10,000 00    |
| Ingham .....             | 3,400 00     |
| Independence .....       | 240,000 00   |
| Strong .....             | 25,000 00    |

Total .....

Manager Coe of the Jo Dandy, Cripple Creek, has bought a 100 H. P. boiler lately on the Lucky Guss mine and the five-drill compressor formerly in use on the Elkton. His plans also include the installation of a larger hoist.

#### IDAHO.

##### BLAINE COUNTY.

The lessees of the North Star mine, on the East Fork of Wood river, have shipped seven or eight 20-ton carloads of ore this summer and have 150 tons of concentrating ore on the dump.

##### BOISE COUNTY.

Caswell Bros. of Boise, operating at Thunder mountain, are reported to have taken out \$17,000 to \$20,000 from the mine lately sold by them to W. H. Dewey of Boise, as the result of an eight days' run while the mine was under examination by the purchaser.

A discovery is reported as being made on Elk creek, 40 miles south of Thunder mountain, of tellurium gold ores. A number of samples from the ledge have run very high, one going over \$400 in gold.

##### CUSTER COUNTY.

The Yankee Fork, on Mount Estes, near Custer, formerly owned by J. A. McFadden but now by Boston parties, with J. Minear as manager, is increasing the milling plant from five to ten stamps and adding concentrators. A hoist is being installed.

##### IDAHO COUNTY.

G. Blaine, late Supt. of the Iron Crown mine on Newsome creek, has taken charge of the Jumbo, at Buffalo Hump, and has a force of twenty-five men at work in the mine and on the stamp mill. The lower level is in about 400 feet on the ledge, with a depth of about 200 feet.

M. O. Reed, general manager of the Inca M. Co., has received returns from a trial lot of ore sent to the smelter from the Mineral World claim of the company's group in the Seven Devils mining district, which show \$30.62 silver, \$8 copper and \$4 gold. After paying all smelting and refining charges, commissions, etc., the ore netted \$30.50 per ton.

J. Glare of Warren has sold his placer claims to C. T. Hathaway of Denver, Colo., for, it is said, \$25,000. The two claims in the property were located several years ago as placer ground and a good deal of gold was taken out. The formation itself appears to have furnished the gold, and when the surface was washed off there was exposed a slate formation filled with rich quartz streaks. The claims will be worked as a quartz proposition.

##### KOOTENAI COUNTY.

About fifteen men are at work at the Weber mine, on Lake Pend d'Oreille, cleaning the underground workings preparatory to starting up mining. The flume to the old combination mill is being repaired, and it is intended to put the concentrator in operation. F. Weber and S. P. Donnelly, who with A. B. Campbell of Spokane own the property, are on the ground supervising work.

The owners of a number of free-milling prospects at Tyson have decided to organize a joint stock company and put in a mill. H. W. Desgranges has gone to Spokane, Wash., as the agent of the owners, to secure information and prices. The mill in contemplation is to be in the nature of a prospector's convenience—possibly only a 2-stamp mill will be installed.

##### OWYHEE COUNTY.

A strong inflow of water at the 1000-foot level has practically stopped operations in the Poorman mine at Silver City for the present. Arrangements were made to commence sinking, but the flow of water could not be handled by the hoisting engine. It is understood that Manager Britt has recommended the installation of an electric pump.

The Cumberland mine, at Silver City, will be shut down until electric power is provided for both mine and mill. Mana-

ger A. Buckbee states that the cost of fuel compels this change. The change has been under consideration since the installation of electricity at the Trade Dollar mines. Mr. Buckbee states that it will be but a short time until all the properties in the vicinity of Silver City must close down or use the Swan Falls electric power.

#### MONTANA.

##### CASCADE COUNTY.

It is reported that the Moulton mine at Nelhart will be started up soon. This mine is owned by the Diamond R. Co., which is operating the concentrator at Nelhart. The Moulton has been idle several years and is known to contain a large body of low-grade ore which will concentrate profitably.

##### FERGUS COUNTY.

(Special Correspondence).—The Kendall G. M. Co. has begun work on a ditch for water and power supply. The ditch will have a capacity of about 6000 miner's inches of water and, with the dam, is expected to cost about \$10,000. Grading for foundations of the power plant has been commenced, and the construction of the new cyanide milling plant of the Kendall Co. at North Moccasin is being rapidly advanced. The plans of the new mill have been changed and provide for 500 tons daily capacity instead of 300 tons as first projected. The shipments of high-grade ore from the Spotted Horse at Maiden for July amount to about \$6000. The Spotted Horse mill has been added to, and with new methods of ore treatment to be employed, it is thought that there will be no necessity for further shipment of the high-grade ore.

Lewistown, July 31.

##### FLATHEAD COUNTY.

A. F. Boardman has four men at work developing his Fourth of July creek claims, near Libby. The Bluebird particularly is making a good showing. About fifty tons of gold ore are piled up on the dump at this claim, taken out in developing the prospect.

##### JEFFERSON COUNTY.

The Colorado M. & D. Co., composed principally of Butte people, is sinking a shaft on the Hidden Treasure claim, near Corbin. It is the intention of the company to continue sinking until the 150-foot mark is reached. The ore is good, assays showing it to have \$1.60 in gold per ton, ten ounces of silver and 8½% of copper. Some of the Butte stockholders are M. Medin, E. L. Mayo, C. Heilbronner, F. Harris, C. Lane and J. Trerise.

At the Boulder-Comstock property, about 2 miles from Basin, A. S. Ray, operating a lease and bond, has been sinking a two-compartment shaft, which has reached a depth of 175 feet, and has struck a considerable body of high-grade copper ore.

##### LEWIS AND CLARKE COUNTY.

G. Austin of Marysville has just opened up a body of gold ore on his claim, about 4 miles from Marysville, that assays at the surface from \$6 to \$50 a ton.

##### MADISON COUNTY.

(Special Correspondence).—The Hecla Con. M. Co. of Melrose operated a crushing and jigging mill at their mine, 12 miles west of here, from 1882 to 1896, in that time piling up over 100,000 tons of mill tailings. Recently the Greenwood M. & M. Co. was organized by Montana people to handle these tailings. The old mill was remodeled and provided with modern crushing and concentrating machinery. The plant is now operating on about 200 tons per day, doing satisfactory work. The material carries silver and lead. The final tailings from the tables are cyanided. Mr. Hascott of Melrose is manager.

Melrose, Aug. 3.

The Alder Gulch M. & M. Co. has been incorporated in New York to operate the Bell and Grand Union mines, located in Alder gulch, and owned by L. B. Bell of Virginia City. It is the intention of the company to begin the preliminary work for the erection of a forty-ton mill. The president of the company is K. W. Robbins and the treasurer is F. Girtanner, both of New York City; M. B. Davis of Virginia City is manager.

Raber & Strobeck have taken a lease on the west end of the Keynote mine, at Sheridan, and have commenced a tunnel to cut the vein at a considerable depth. Pritchett & Eastridge have taken out several carloads of high-grade galena ore from the east end, which they have been working under lease. The Keystone is owned by H. D. Rossiter of Sheridan.

W. B. Millard of Pony has taken an eighteen months' lease and bond on the Kearsarge mine at Summit, and has started work with Supt. H. Ptomie to systematically develop the mine.

##### MEAGHER COUNTY.

Thos. Cruse is having a milling test

made of ore taken from his claim at Thompson gulch, near White Sulphur Springs. The ore is taken from a quartzite cliff face. A horse whim has been put in position and a shaft is being driven down on the lead. A diamond drill has also been installed to test the lode by boring. The trend of the lead is east and west and there are parallel veins and reefs of porphyry. There are also porphyry dykes running at right angles. W. J. Sweeney is Supt.

A mining stampede has been started to the Big Snowy mountains by the discovery of rich gold-bearing copper and sand carrying free gold. L. Penwell, who brought the news to Helena, says: "I was shown samples of the sand and it was full of pin heads of gold and was wonderfully rich. There was said to be a great quantity of it. The whole population of Martinsdale, Harlowton, Ubet and Garnall had gone up the mountains to look for the place, and the towns were almost deserted. Careless Creek is about 30 miles from Harlowton, which is the nearest place on the railroad."

##### PARK COUNTY.

Development in the Bear Gulch mine, at Jardine, has lately uncovered a new vein of high-grade ore. Plans are under consideration for building a 60-stamp mill, which, with the present mill of twenty stamps, would make eighty stamps. There is said to be enough ore in sight to supply it. The mill is to be built next spring.

##### SILVER BOW COUNTY.

(Special Correspondence).—The Alice mine at Walkerville—one of the original silver mines of the Butte district—is outputting about 600 tons of ore a month by leasers. The company which owns the mine is considering methods of treating the large tonnage blocked out above the 200-foot level by leaching. The ores—above the water level—comprise oxidized material carrying small values in silver and gold in an iron and manganese gangue. But below the level of the ores described above are large bodies of lead and iron sulphide, with about 18% zinc, carrying small values in gold, silver and lead, the whole material usually running about 35% silica. Numerous and various methods of concentrating these ores have been tried, but with rather unsatisfactory results. In trying to separate the iron from the zinc and eliminate the silica heavy losses are made, and other methods are being tried that may solve the problem, as the tonnage of this grade and character of ore in the lower levels of the Alice is said to be large. The Alice lode is about 200 feet wide between the walls, within which the ore runs in shoots, veins and chimneys through the wide ledge.

Butte, Aug. 1.

The Colusa-Parrott Co. have brought suit to enjoin over eighty farmers from diverting the waters of two creeks, contending that all water should flow to the smelting works without interruption. The ranchers have been using the water for irrigating. A temporary restraining order has been issued.

#### NEVADA.

##### LINCOLN COUNTY.

The Manhattan M. & S. Co., capital \$12,000,000, has been incorporated in New Jersey to take over the sixty-seven properties owned by the Pioche Con. Co. and others, to a total of about 100 mines, together with hoisting works, smelters, pumping plants and the electric light and water systems of Pioche. The undertaking calls for payment of \$1,000,000 within the next eighteen months and was promoted by A. B. Lewis of Frisco, Utah, New York people being associated with him. Work has already been started at several points and within a year, Mr. Lewis says, the new company will be working from 1000 to 1500 men.

H. A. Cohen, general manager of De Lamar's companies, says the mill at De Lamar will probably close down in August and before it is started up again will have many alterations, the most important of which will be the substitution of a "wet" for the "dry" process so long employed. The force of men at De Lamar at the present time will be reduced one-half temporarily. As soon as the wet process is installed it will start running on low-grade ore and 400,000 tons of tailings.

##### LYON COUNTY.

L. H. Rodgers, one of the Cuyahoga M. Co., operating near Yerington, says his company is about to establish a pneumatic cyanide plant at the Cuyahoga mill to work the tailings.

##### NYE COUNTY.

Shipping ore is accumulating on the dumps at Butler much faster than the teams can haul it to Sodaville. It is said 7527 sacks of ore await shipment.

W. H. Dickson and A. C. Ellis, Jr., of Salt Lake City, Utah, have bonded the Wandering Boy, Stone Cabin and Lucky

Jim claims at Butler, Tonopah county. The price to be paid is \$35,000. W. A. Wilson is manager.

#### WASHOE COUNTY.

Twenty-three men are at work in the Reno Star mine, near Reno. The principal work being done is in blocking out pay ore. The Bell shaft ore is being blocked out and the work of raising ore to the surface will be commenced in a few days. An electric hoist will be installed.

The Reno Chance mine has been incorporated. The mine is near the Reno Star and consists of the Eastern Star, Look-out, Isabella, Alturas, Great Northern and Dunlap claims. R. Eason is president, G. W. Perkins secretary and C. J. Frisch treasurer, with offices at Reno. A shaft has been sunk 115 feet on one of the claims. A contract is to be let to run a 200-foot drift from this shaft.

#### WHITE PINE COUNTY.

P. C. Weber, M. B. Garaghan, R. A. Riepe and W. Clements have bonded to Salt Lake, Utah, people five claims on Saw Mill canyon, near Ely.

#### NEW MEXICO.

##### RIO ARRIBA COUNTY.

The Belle Royal Copper M. & M. Co. has been incorporated by A. Royal, B. Royal and C. W. Murray of Pueblo, Colo.; capital, \$1,000,000. The directors are A. Royal, T. Kelly, B. Royal and C. W. Murray of Pueblo, Colo., and A. Royal, Jr., with office at Pueblo, Colo. The company will mine in the Bromide mining district, near Tres Piedras.

##### TAOS COUNTY.

It is reported that W. Fraser of Amizett has sold his group of mines to A. C. Twining of Asbury Park, N. J., representing the Copper Mountain M. Co., for \$125,000. A 100-ton smelter is said to be projected.

#### OREGON.

##### BAKER COUNTY.

The California mine, located in the Cable Cove district near Sumpter, has been sold by H. Cabell, J. Cabell, B. F. Cabell and W. F. Cabell, the original owners, to the Turnagain Arm M. Co., of Minneapolis, Minn. The price paid is said to have been \$60,000, and included with the California several other smaller claims. The new owners have announced their intention to expend a large sum in development work and improvement.

##### GRANT COUNTY.

(Special Correspondence).—The Intermountain group is in charge of Supt. Hahn, who is developing the property through a tunnel.

Near Alamo the Yellowstone group is being developed by Geo. J. Barrett, who has crosscut 350 feet to a ledge of ore and drifted thereon 100 feet. The crosscut extends 250 feet further to a second vein. The work disclosed quartz, talc and iron sulphides carrying gold values. Mr. Barrett is also doing some development on other claims near the Red Boy group.

The Climax, north of Granite, is being developed by the Eastern Oregon M. Co., in charge of C. R. Aldrin. A lower tunnel, now in 200 feet, is being driven to cut a vein that has been opened at a higher point.

The Buffalo, west of Granite, is operating with a small force and is in charge of R. T. Cox of Portland.

The Cougar, which has a 250-ton cyanide and crushing mill, ran several months last year, but is now idle. The Magnolia, in the same locality, is also idle.

Ten miles west of Granite, on the north fork of the John Day river, are the placer workings of the Thornburg Placer & M. Co., in which Dewey Bros., of Denver and Georgetown, Colo., are principally interested. The operations are in charge of Supt. W. S. Duncan, with A. Glenn as foreman. Their holdings extend over both sides of the stream for 3½ miles. The water for the hydraulic work is diverted from the stream about 4 miles above the principal operating point. The upper section is 2850 feet of flume, then 1½ miles of open ditch, then 8500 feet of flume, with a pressure of 250 feet from the lower end of the flume to the giants, of which there are two in operation. The gravel bars are stated to be from 25 to 40 feet deep. This company purchased the property two years ago and this is their second season's work. The company have a saw-mill 2 miles up the river which has furnished the lumber for flumes and buildings.

Sumpter, Aug. 1.

##### JOSEPHINE COUNTY.

Winningham & Van Gorder of Forest creek, near Grants Pass, are running a tunnel to tap their ledge 165 feet down and are now in 205 feet.

G. Garrett and F. Bachman of Gold Hill have bought the placer claims of Prof. Barnhart on Applegate creek.

G. E. Morse of San Francisco, manager of the Swayne M. Co., while in Jackson-



ville lately, made arrangements for the early starting of work on the ground which they have bonded of P. F. Swayne of Applegate.

D. S. Rae of the Klondike mine, on Louse creek, near Grant's Pass, reports that in sinking from the upper tunnel of the mine a rich shoot, from 2 to 4 feet in width, was struck at a depth of 80 feet.

A new placer mine is to be operated near Waldo by F. H. Osgood of Seattle, Wash., who has bought a large area of placer ground.

Stamps, concentrators, drills and other machinery are being installed at the Golden Wedge mine, on Regueriver, near Grant's Pass. This mine was for several years worked with an arrastra.

#### UTAH.

Mining dividends for July are as follows:

|                         |           |
|-------------------------|-----------|
| Cent. Mercur.....       | \$125,000 |
| Centennial-Sunsets..... | 50,000    |
| Daily-West.....         | 52,500    |
| Mammoth.....            | 26,000    |
| Ontario.....            | 15,000    |
| Sacramento.....         | 5,000     |
| Silver King.....        | 100,000   |
| Utah.....               | 2,000     |
| Total.....              | \$389,500 |

#### BEAVER COUNTY.

The Morrison option on the Copper King group of copper-bearing locations, in Star district, near Milford, has been taken over by the Blue Bird M. Co., of which P. A. H. Franklin of Salt Lake City is president. The group, which consists of six locations, was bought by L. Morrison and A. J. Berles about a year ago, since which time they have been developing the ground so satisfactorily that the erection of a smelter is projected.

At the Hoosier Boy group, near Milford, which is operated on a bond by A. B. Lewis, seventeen men are employed drifting north and south on the 200-foot level on silver and lead ore.

The main shaft of the Milford M. Co., at Milford is now down 80 feet and is being equipped with a whim capable of sinking to a depth of 400 feet. Ores have been in the meantime uncovered in several openings on the vein through a length of 400 feet. P. S. Martin is manager.

#### BOX ELDER COUNTY.

The Pine Canyon G. M. Co., capital \$100,000, has been incorporated. A. R. Carter is president and W. E. Maddison secretary, with offices at Salt Lake City. The company owns the Mount No. 2, Emmer, Emmer Nos. 1 and 2, First East extension of the Emmer, Pine Tree and Pine Tree No. 1 claims, with a mill site and water right in Pine canyon.

#### GRAND COUNTY.

The International M. Co. of Beaver Basin has struck a fine body of peacock copper ore.

#### IRON COUNTY.

The Big Fourteen Co., composed of Salt Lake, State line and Cedar City people, are projecting a mill for their mine at State line. W. Dooley is superintendent at the mine.

#### JUAB COUNTY.

The Pharus Con. M. & M. Co. has been incorporated, capital \$800,000, with C. E. McCortick president and R. G. Wilson secretary and treasurer, with office at Salt Lake City. The company owns the Martin, the Malagany, the James G. Blaine and the Pharus mining claims, in the Tropic mining district.

#### PIUTE COUNTY.

The Twentieth Century G. M. Co., capital \$500,000, has been incorporated to operate the Miner's Dream, Smith & Weston and Ben Ton claims, in the Otto district. G. Morrow is president and A. Cain secretary, with offices at Salt Lake City.

#### SUMMIT COUNTY.

The Hawkeye-McHenry M. Co., capital \$800,000, has been incorporated to operate a lease and bond on the McHenry lodes Nos. 1 and 2 at Park City. The lease is for two years and the option price is \$50,000. H. D. Niles is president of the company and J. R. Walker is secretary and treasurer.

At the mill of the California M. Co., at Park City a 140-ton Huntington mill will be added to the plant.

#### TOOELE COUNTY.

Manager M. R. Hunt of the Utah Queen, Dry canyon, has bought of J. McRae and J. B. Hoeman of Tooele the old Rarrier mine, adjoining the Hidden Treasure of Dry canyon, for his company. Mr. Hunt will put a force of men at work on the property at once.

#### WASATCH COUNTY.

The Harwood M. Co. has been incorporated, capital \$15,000, to operate the Lost Boulder and five other claims in the Blue Ledge mining district. R. T. Kimball is

president and L. B. Wright secretary, with office at Salt Lake City.

#### WASHINGTON.

##### FERRY COUNTY.

In the Princess Maud the shaft is down 435 feet, and the 400-foot level, 650 feet below the surface, has been started. The ledge has an average width of about 4 feet. The values are much more uniform than they were at the 300-foot level.

The Butte & Boston mine, at Republic, C. C. Grebbs, superintendent, has developed the pay shoot on the 250-foot level. The drift is in 140 feet, and a sample from the face of the drift showed an assay value of \$78.24, with 10.25 ounces of silver per ton.

J. Young and associates, who have taken a bond on the Montana and two other properties at Meteor, are negotiating for some ground close to the Meteor and M. & W. claims.

On the Stray Dog work has been resumed in the shaft. Mr. Olmstead of New York is about to order a hoisting plant with a capacity to work down to the 600-foot level.

##### PIERCE COUNTY.

The Gold Crown Tunnel M. Co. of Tacoma has started work on a mile tunnel through Gold hill, near Summit, 75 miles east of Tacoma, which is expected to cut thirty-five veins. The face of the tunnel is now within 50 feet of the main vein in the Eva claim. Besides opening its own ledges, the tunnel company will open claims owned by other parties. The company has taken a water power sufficient to run compressors, drills, cars, a sawmill and other plant.

The Tacoma smelter is preparing for the treatment of a larger tonnage of copper ores from Alaska and from the coast of British Columbia. The new copper plant will reduce 300 tons per day to matte, and a converter plant is being put in to reduce the matte to blister copper. The Nahmint mine, on Alberni canal, on the west coast of Vancouver island, is to supply 150 tons of ore daily.

#### WYOMING.

##### CARBON COUNTY.

W. R. West, manager of the Carbon County M. & M. Co., Montana, has bought a compressor and other plant to do development work on a copper and gold proposition, 35 miles northwest of Laramie, toward Encampment. A tunnel is now 700 feet toward a vein, assays from which have returned high figures.

The smelter at Encampment has been started up and the ores of the Charter Oak mine are being reduced. This is the first smelter in the State of Wyoming.

#### FOREIGN.

##### BRITISH COLUMBIA.

The Prospectors' Exchange of Nelson says about twenty men are employed at the Enterprise, Slokan district, under Foreman McPhee. Machinery for the concentrator is on the ground.—The Rambler-Cariboo Co., Sandon, has bought the Washington mill from Mitchell & St. Jean and will set it up to treat the Rambler ore.—Good progress is being made on the iron property at Kitchener. Forty-five men are employed with diamond drills, making borings and surface pit work. The deposit has now been explored to a depth of 160 feet and the cores show a high grade of hematite iron ore.—There are between 200 and 300 men, mainly prospectors, in the vicinity of Cambarne, the new Fish river free gold camp, Lardeau district. The London & B. C. Gold Fields Co. employs thirty men at the Eva and A. F. Rosentenger, manager of the Rosenberger Syndicate, employs twenty more men on the Oyster and Cambarne groups.

Nelson, Aug. 3.

The Rambler-Cariboo has declared its fifth dividend of 1 cent a share, \$12,500, to be paid August 30, being the total dividends up to \$127,500. At the annual meeting at Rossland the old board of directors and officers were re-elected. A. P. McLaine, president; J. J. Humphreys, vice-president; and W. H. Adams, secretary, treasurer and manager. The lowest working in the mine is 700 feet deep on No. 3 level. The drift at this point is in 300 feet, of which 200 feet runs on the lead and is in solid ore. The smelter returns from fifty carloads of ore, practically all from this drift, gave 123 ounces of silver and 484 lead. A new hoist, additional compressor power, an electric light plant and a 15-ton concentrator, all to be run by water power, are being installed.

The returns for the month of June from the Ymir mine show an estimated profit on working of \$22,000, making the total net profit for the first half of the year \$180,512.

The June cleanup from the cyanide

plant at the Athabasca mine at Ymir yielded \$5872.

The Fern mine is to shortly resume operations after being shut down for over a year. It has been leased to R. Nicholls for ten years. The property is a free-milling gold proposition, developed and equipped with a 10-stamp mill and small compressor plant.

J. Russell, president and managing director of the Fairview Corporation, Ltd., has reorganized the company under the name of New Fairview Corporation, Ltd. Mr. Russell says: "We propose to dismantle the Tin Horn mill and put it up on the mill site of the Stenwinder mine. This mill is of 16-stamp capacity, having eight batteries of two stamps each. The company has also bought the Joe Dandy mill of ten stamps, which will also be taken down and removed to the new site. During the erection of the mill work at the Stenwinder will be advanced. We expect to treat \$4 rock and make it pay. With the showing we have in the mine, a large daily output should give a small margin of profit. If we find that with the twenty-six stamps we can make a success, the capacity will be doubled."

The shipments from Phoenix for the week ending Aug. 3rd were 8144 tons, being 4697 tons of ore from the Old Ironsides group; 1255 tons from the B. C. group; 80 tons from the R. Bell; and 2112 tons from the Mother Lode mine in Deadwood camp. Total boundary shipments for the year to date are 207,830 tons. For the first time the B. C. mine began shipping to the Mother Lode smelter at Greenwood last week. This ore had been going to the Trail smelter.

C. Livingston, manager Tyee M. Co. at Mount Sicker, Vancouver island, states that the body of ore which the Lenora people are working has been struck in the Tyee shaft. Now that the Tyee people have reached the ore the proposition for the establishment of a smelter at Osborne bay will be carried out. A smelter will probably be erected at Mount Sicker soon, as the Lenora is increasing its output.

#### MEXICO.

(Special Correspondence).—An option for ninety days has been taken by W. Farrell for New York people on the Esperanza mine at Parral, owned by J. Harvie and associates, at \$250,000, gold. This property is located in the Minas Nuevas district, adjoining the Palmito mine. In the Santa Ana mine at Parral a 3-foot vein of ore has been struck that assays 25 kilos and 600 grams per ton. The property belongs to J. Harvie and associates. T. E. Shurr has bought from C. Tunessi and associates the Reconpensa for \$21,000. Development work has been started, supervised by the new owner. There is at present some shipping ore on the dump.

Parral, Chihuahua, July 30.

A. F. Wuensch, manager of the Celera mines in Sonora, states that he is preparing to begin the erection of the concentrating plant at once. The mill is to be worked by water power of the San Miguel river.

#### RUSSIA.

It is reported that American and French capital are to operate a concession of 1100 square miles of gold, silver, copper and platinum-bearing mineral lands in the South Ural mountains, Russia. The tract is said to be part of the Cabinet possessions, the personal property of the Czar. Among those appearing so far in the transaction are G. Treadwell, a mining engineer of New York, and Paul Annasaff of St. Petersburg, Russia, one of the builders and at present an associate manager of the Transiberian railway.

##### THE KLONDIKE.

A London company has obtained a crown grant of a water right in the Klondike river to supply the hillside and bench claims in the district with water. The company is composed of M. H. O. Ewing and A. N. C. Treadgold of London, England, and W. Barwick of Toronto, Canada. In the rights granted it is stipulated that so far as possible they must bring to all claims in the country sufficient water to work them to the fullest extent. It is required that they spend not less than \$250,000 before December 31, 1902. Certain clauses of the grant protect the individual miner, and the charge which the company makes is limited to \$1 per miner's inch per hour (?). Work has already been commenced at the head works on the Klondike, to prepare for the main aqueduct.

##### THE TRANSVAAL.

The Turf Club bore hole at Johannesburg has struck the main gold reef at a depth of 4800 feet. The discovery, it is said, establishes a permanent gold industry for seventy years, and practically proves that there are additional deep levels equivalent to a whole line of outcrop mines.

#### Personal.

P. JOYCE, Supt. Bald Mountain mine, Sumpter, Or., is in Spokane, Wash.

G. BLAINE has been appointed Supt. Jumbo mine, at Buffalo Hump, Idaho.

J. S. CHILDS, manager of the Bully Chopp mine, Shasta county, Cal., has resigned.

LEWIS T. WRIGHT, manager Mountain Mines, Ltd., at Keswick, Cal., is in San Francisco.

R. M. JONES has returned to Cripple Creek, Colo., after some weeks' sojourn in California.

P. L. FEARNE, manager of the Jesus Maria mine at Parral, Chihuahua, Mexico, is in New York.

J. A. WALKER, Pres. Rosaria M. Co., at Guadalupe y Calvo, Sonora, Mexico, is visiting the mine.

H. N. GALER has been appointed assistant manager Miner-Graves Syndicate, at Grand Forks, B. C.

P. H. WISEMAN, manager of the Shannon Copper Co., Morenci, Arizona, has returned from New York.

C. CUMMINS is at Sheep Ranch, Calaveras county, Cal., engaged in constructing a large cyanide plant.

PHILLIP ARGALL, M. E., of Denver, Colo., is engaged in professional work in British Columbia and Canada.

G. ROBINSON, formerly superintendent of the Kendall mines at North Moccasin, Mont., is at Teller City, Alaska.

C. H. PEARCE, M. E., of Oakland, Cal., who has been in New York for some months, has gone to Nome, Alaska.

C. G. CARRUTHERS of Colville has been appointed superintendent of the Shelbyville Con. M. Co., operating two claims near Colville, Wash.

FRED BURBIDGE has resigned as manager Bunker Hill & Sullivan mine, Wardner, Idaho, and will visit England. A. Burch, late Supt. of the mine, has been made manager.

#### Commercial Paragraphs.

HENRY E. WOOD has enlarged his ore-testing plant at Denver, Colo., and added some new equipment.

ARMOUR & Co. have just entered their third order for Cross oil filters furnished by the Burt Mfg. Co. of Akron, Ohio.

"CARNEGIE ROLLING MILL, Manchester Locomotive Works, Boston & Main Railway Co., Fore River Ship & Engine Co., Navy Department, and almost every prominent maker and user of machinery are now using Jupiter steel," says Wm. J. Wilson, C. E., who is looking for a Pacific coast location.

THEO. HIERTZ & SON have removed their works from Park Ave. to 10th and Poepping Sts., St. Louis, Mo., where the possession of two acres of ground gives them better facilities and more room. Their plant is on the Oak Hill branch of the Mo. Pacific & Iron Mt. R. R., securing good switching facilities.

THE Hendrie & Bolthoff Mfg. & Supply Co. of Denver, Colo., are erecting a 175-ton concentrator for the Big Kanahwa Leasing Co., at Creede, Colo. The power will be furnished by water that flows from the Nelson tunnel, which will be applied to generators and electric motors. The Big Kanahwa Co. also handle their ore through the tunnel.

THE Gardner Electric Drill & Machinery Co. report the shipment of twelve drills from their Denver shop within the past week, four going to various Colorado mines, three to British Columbia, three to Australia, one to London, England, and one to Montana. They are building what will be known as their Intermediate drill, to weigh 250 pounds unmounted for general work.

THE water power on the Catawba river at Rhodhiss, N. C., is one of the largest in the United States, and will be utilized for cotton manufacturing and other purposes. The S. Morgan Smith Co. of York, Pa., recently shipped to the Rhodhiss Manufacturing Co. two pairs of 36-inch and one single 30-inch McCormick turbines, mounted in iron cases, with the necessary supply pipes, draught tubes, a complete rope drive, as well as head shafts, couplings, bearings and a 1000-gallon fire pump.

THE American Diamond Rock Drill Co. report as among recent sales shipments of their machines to Tennessee, Montana, Michigan, Mexico, British Columbia, Alaska, Cuba, the Philippine islands and Spain. One order to be shipped to Spain was an especially large and complete one, covering and including drills of all capacities, from 400 to 3000 feet, and with all styles of mounting. Expert men are usually sent out by this company to take charge of all drills shipped. Both in ex-



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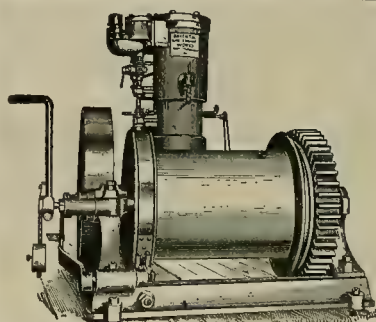


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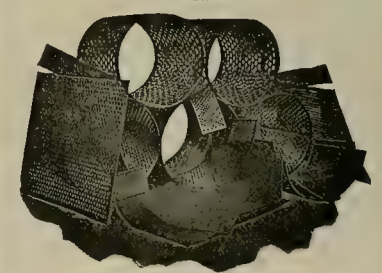


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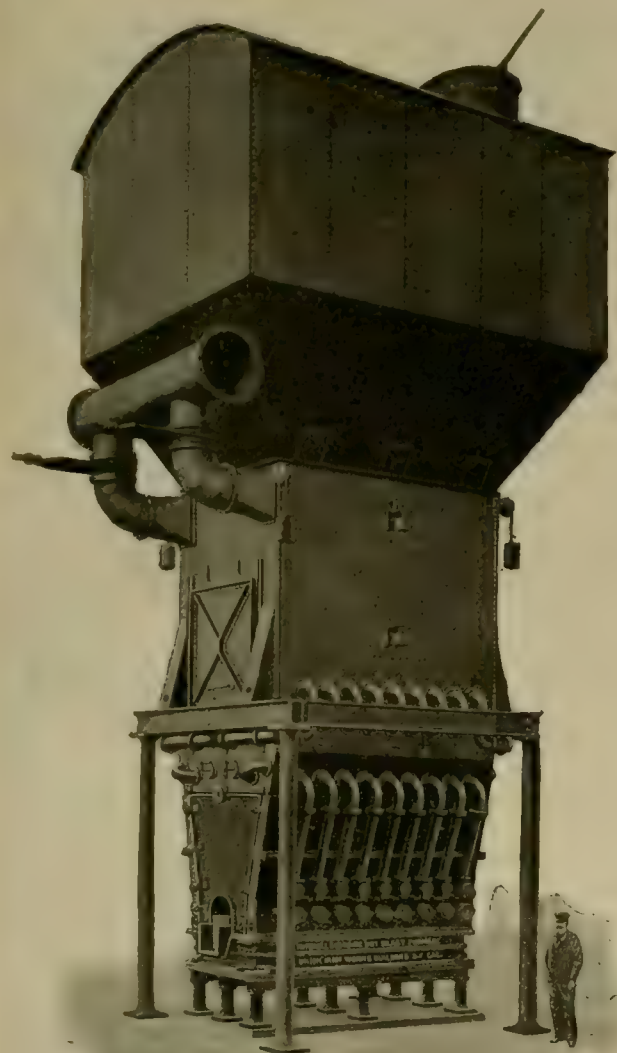
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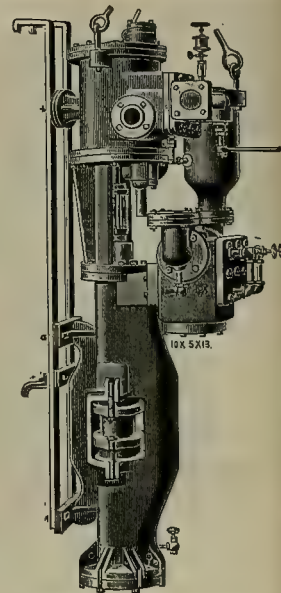
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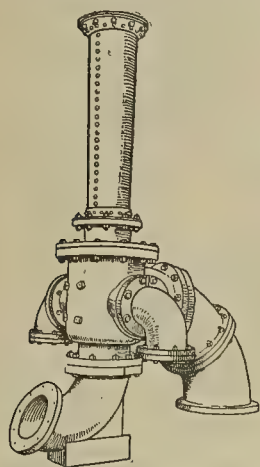
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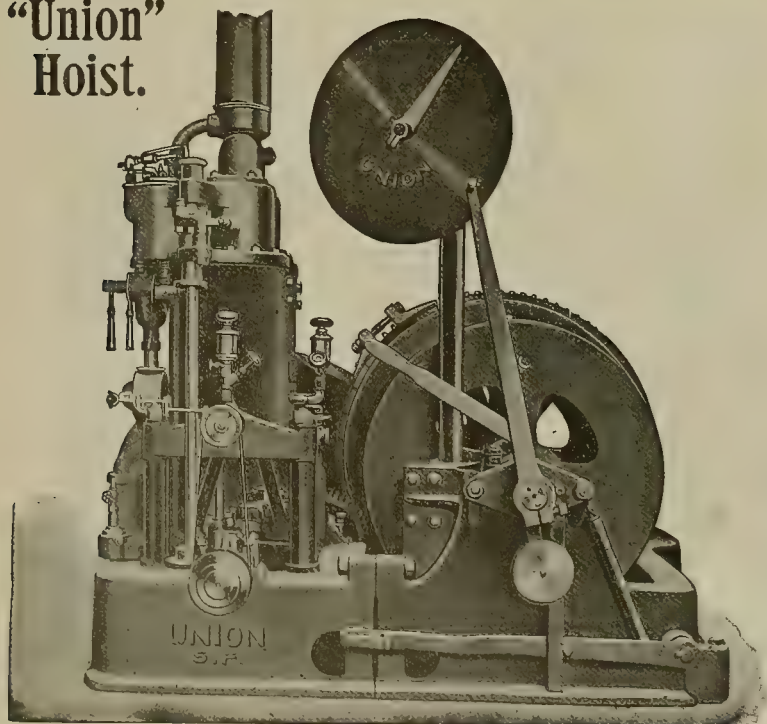
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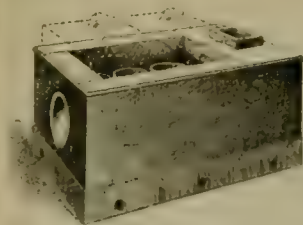
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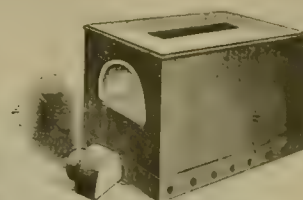
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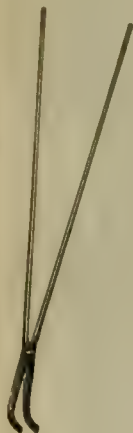
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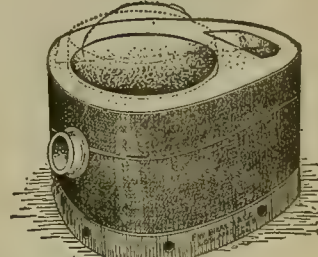
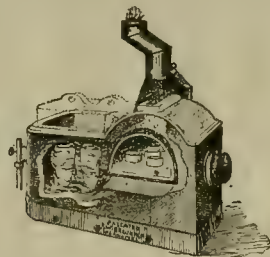
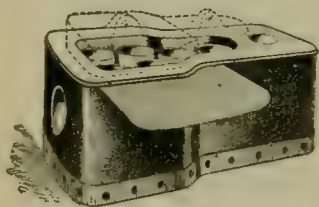
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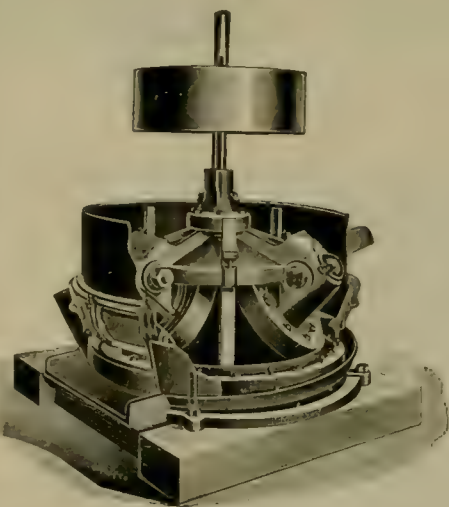
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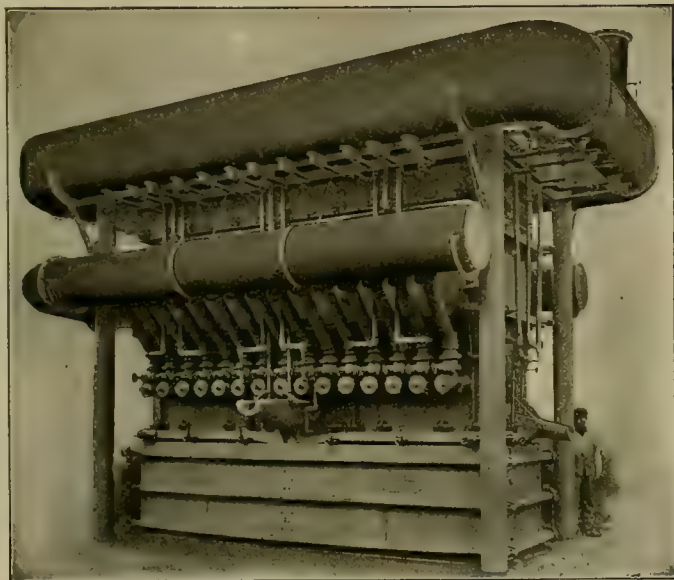
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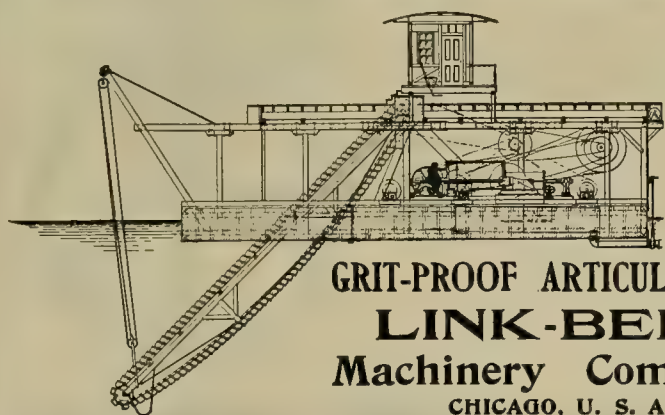
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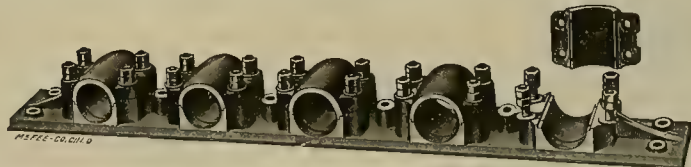
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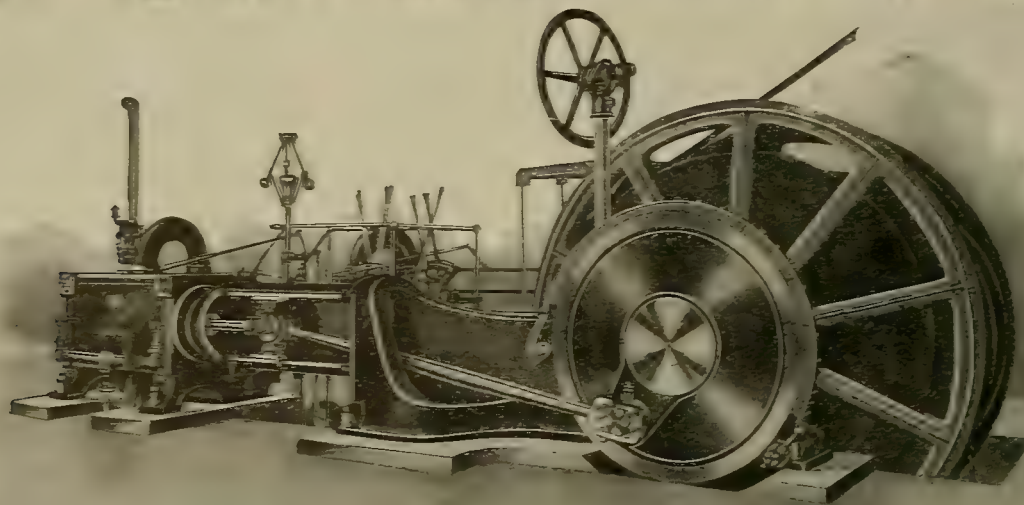
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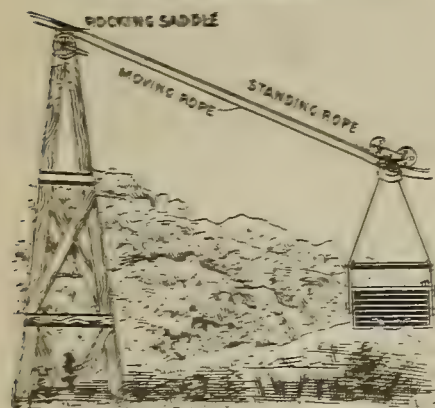
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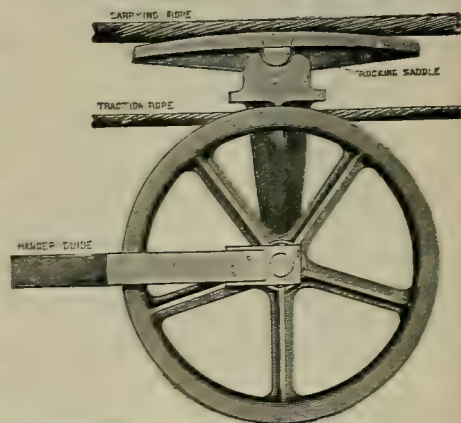
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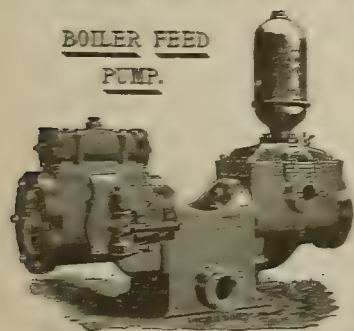
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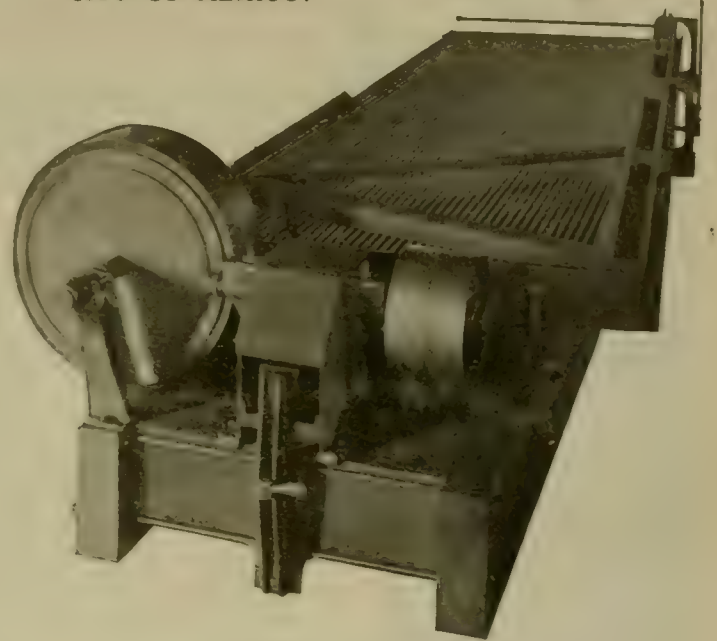
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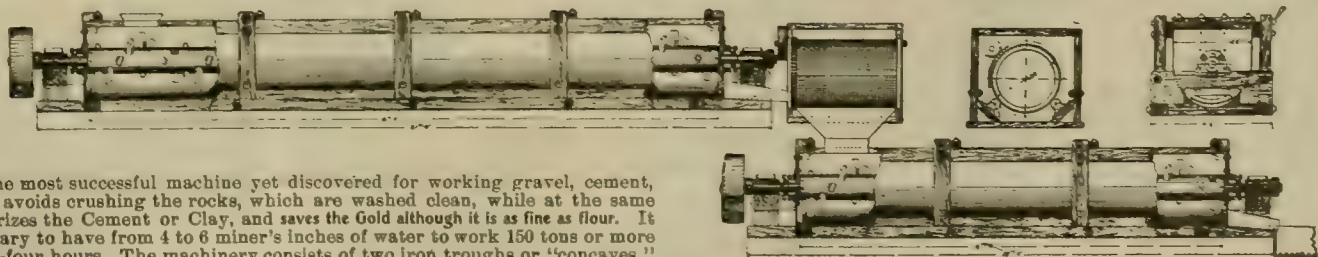
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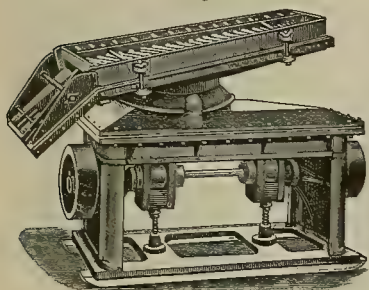
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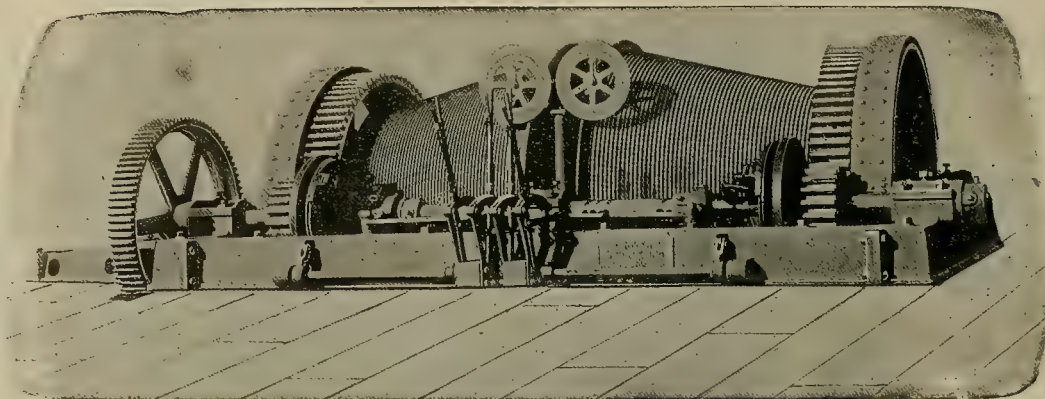
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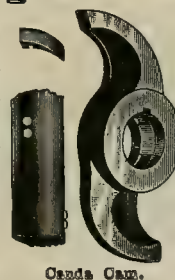
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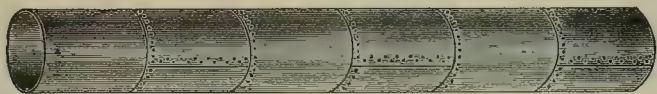
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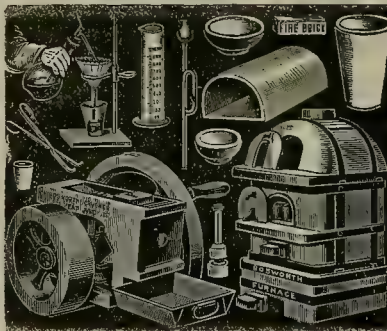
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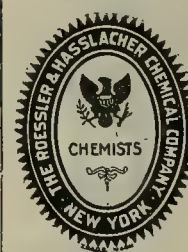
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ASSESSMENT NOTICES.

CONSOLIDATED ST. GOTHARD GOLD MINING Company.—Location of principal place of business, San Francisco, California; location of works, Nevada County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 28th day of July, 1901, an assessment (No. 19) of ten cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin to the secretary, at the office of the company, 113 Crocker Building, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 15th day of August, 1901, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 23 day of September, 1901, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

H. N. SHOECRAFT, Secretary.

Office—113 Crocker Building, San Francisco, California.

EUREKA CONSOLIDATED DRIFT MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Placer County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 9th day of July, 1901, an assessment (No. 3) of one-half cent per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin to the secretary, at the office of the company, 214 Pine Street, room 31, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 15th day of August, 1901, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 23 day of September, 1901, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

GEO. W. DIXON, Secretary.

Office—214 Pine Street, room 31, San Francisco, California.

THE BUTTE BASIN GRAVEL MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Amador County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 23rd day of July, 1901, an assessment (No. 3) of one cent per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at his office, 35 Stuart Street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 31st day of August, 1901, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 23rd day of September, 1901, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

O. E. HOLMES, Secretary.

Office—No. 35 Stuart Street, San Francisco, California.

THE CALIFORNIA DREDGING COMPANY.—Principal place of business, 120 Sutter Street, San Francisco, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 6th day of August, 1901, an assessment of \$10 per share was levied upon the capital stock of the corporation, payable immediately in gold coin, to the secretary of the corporation, at the office of the company, Room 56, 120 Sutter Street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on TUESDAY, the 10th day of September, 1901, will be delinquent and advertised for sale at public auction; and unless payment is made before, will be sold on TUESDAY, the 1st day of October, 1901, to pay the delinquent assessment, together with the cost of advertising and expenses of sale.

(Signed) SAM. W. CHEYNEY, Secretary.

120 Sutter Street, San Francisco, California.

DELINQUENT SALE NOTICE.

YUBA CONSOLIDATED GOLD MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Nevada County, California.

Notice.—There are delinquent upon the following described stock, on account of assessment (No. 2) levied on the 22nd day of June, 1901, the several amounts set opposite the names of the respective shareholders, as follows:

| Names. | No. | No. | Cert. | Shares. | Amt. |
|----------------|-----|-----|-------|---------|---------|
| John Finn..... | 23 | 500 | | | \$15 00 |

And in accordance with law, and an order from the Board of Directors, made on the 22nd day of June, 1901, so many shares of each parcel of such stock as may be necessary, will be sold at public auction, at the office of the secretary, at Room 801 of the Claus Spreckels Building, corner of Third and Market Streets, San Francisco, California, on MONDAY, the 19th day of August, 1901, at the hour of 1 o'clock P. M. of said day, to pay said delinquent assessment thereon, together with costs of advertising and expenses of sale.

EDWARD H. STEARNS, Secretary.
Office—Room 801, Claus Spreckels Building, San Francisco, California.

ANNUAL MEETING.

The Regular Annual Meeting of the Stockholders of the AMERICAN OIL AND REFINERY COMPANY will be held at the company's offices, Rooms 322-323 Parrott Building, 825 to 855 Market St., in the City and County of San Francisco, on MONDAY, the 19th day of August, 1901, at 1:30 P. M., for the election of directors for the ensuing year and the transaction of such other business as may properly come before the meeting.

J. C. ANTHONY, Secretary.

THE CALIFORNIA D-BRIS COMMISSION, having received applications to mine by the hydraulic process from O. F. Sloan et al. in the Old Stiff gravel Mine, near Vallecito, Calaveras Co., to deposit tailings in Wade's Gulch; from W. C. Ruff and Manuel Loal, in the South Honcut Mine, in Yuba Co., near Bangor, to deposit tailings in South Honcut Creek; from Henry Hanley and Marcus Starbuck, in the Last Chance Gravel and Seams Mine, near Canyon, El Dorado Co., to deposit tailings in Big Canyon; and from Arthur R. Pride and Robert Bobb, in the Willow Placer Mine, near Bassett's, Sierra Co., to deposit tailings in Deer Creek, gives notice that a meeting will be held at Room 59, Flood Building, San Francisco, Cal., on August 19, 1901, at 1:30 P. M.



DELINQUENT SALE NOTICE.

AMERICAN OIL AND REFINERY COMPANY.—Location of principal place of business, San Francisco, California; location of works, Contra Costa County, California.

Notice.—There are delinquent upon the following described stock, on account of assessment (No. 3) levied on the 26th day of March, 1901, the several amounts set opposite the names of the respective shareholders, as follows:

| Names. | No. | No. | Cert. | Shares. | Amt. |
|-------------------------------|------|--------|-------|---------|--------|
| Allen, S. L..... | 119 | 12 | | | \$ 60 |
| Anderson, Mrs. Lulu..... | 270 | 2 | | | 10 00 |
| Anthony, J. C., Trustee..... | 787 | 1,000 | | | 70 00 |
| Anthony, J. C., Trustee..... | 788 | 1,000 | | | 50 00 |
| Anthony, J. C., Trustee..... | 789 | 1,000 | | | 50 00 |
| Anthony, J. C., Trustee..... | 790 | 50 | | | 25 00 |
| Anthony, J. C., Trustee..... | 801 | 50 | | | 25 00 |
| Anthony, J. C., Trustee..... | 802 | 50 | | | 25 00 |
| Anthony, J. C., Trustee..... | 803 | 50 | | | 25 00 |
| Anthony, J. C., Trustee..... | 831 | 50 | | | 25 00 |
| Anthony, J. C., Trustee..... | 854 | 1,000 | | | 50 00 |
| Anthony, J. C., Trustee..... | 1021 | 4,300 | | | 215 00 |
| Avery, Mrs. Jennie..... | 746 | 5 | | | 25 |
| Avery, Mrs. Jennie..... | 729 | 5 | | | 25 |
| Barto, Harrison..... | 408 | 2,000 | | | 125 00 |
| Barto, Harrison..... | 812 | 500 | | | 25 00 |
| Barto, Harrison..... | 813 | 500 | | | 25 00 |
| Barto, Harrison..... | 814 | 500 | | | 25 00 |
| Benecke, Diederich..... | 85 | 1 | | | 1 |
| Bergman, Mrs. Augusta..... | 712 | 35 | | | 1 75 |
| Brown, Mrs. Ida M..... | 152 | 7 | | | 35 |
| Huckley, Morris..... | 788 | 50 | | | 2 50 |
| Carr, H. W..... | 719 | 5 | | | 25 |
| Conn, Mrs. Sarah A..... | 529 | 20 | | | 1 00 |
| Conn, Mrs. S. A..... | 993 | 25 | | | 1 25 |
| Corbier, C. C..... | 564 | 250 | | | 12 50 |
| Corbier, C. C..... | 565 | 5 | | | 25 |
| Cress, L. T..... | 286 | 2 | | | 10 |
| Cridge, A. D..... | 503 | 1 | | | 5 |
| Cumbers, Mrs. Maria L..... | 171 | 5 | | | 25 |
| Donnelly, Mary M..... | 49 | 14 | | | 70 |
| Dunlap, Mrs. W. B..... | 536 | 10 | | | 50 |
| Donaldson, Benj. S..... | 1141 | 50 | | | 25 00 |
| Ellis, Charles P..... | 184 | 2,000 | | | 100 00 |
| Ellis, Charles P..... | 1127 | 10,000 | | | 500 00 |
| Estey, J. C..... | 1045 | 100 | | | 5 00 |
| Estey, J. C..... | 1046 | 20 | | | 1 00 |
| Falls, Sarah..... | 557 | 40 | | | 2 00 |
| Fetrow, Mrs. Maria W..... | 172 | 3 | | | 15 |
| Fisk, Andrew J..... | 806 | 2 | | | 10 |
| Freese, A. J..... | 6 | 40 | | | 2 00 |
| Freese, A. J..... | 7 | 40 | | | 2 00 |
| Freese, A. J..... | 264 | 10 | | | 50 |
| Freese, A. J..... | 278 | 10 | | | 50 |
| Freese, A. J..... | 279 | 10 | | | 50 |
| Freese, A. J..... | 280 | 20 | | | 1 00 |
| Freese, A. J..... | 281 | 20 | | | 1 00 |
| Freese, A. J..... | 282 | 20 | | | 1 00 |
| Freese, A. J..... | 283 | 20 | | | 1 00 |
| Freese, A. J..... | 284 | 345 | | | 17 25 |
| Freese, A. J..... | 450 | 20 | | | 1 00 |
| Freese, A. J..... | 659 | 50 | | | 2 50 |
| Freese, A. J..... | 671 | 50 | | | 2 50 |
| Hildebrandt, Henry..... | 256 | 65 | | | 3 25 |
| Hildebrandt, Henry..... | 257 | 100 | | | 5 00 |
| Hildebrandt, Henry..... | 258 | 1,000 | | | 50 00 |
| Hoover, John D., Trustee..... | 1040 | 433 | | | 33 35 |
| Hoover, Miss Esther..... | 979 | 100 | | | 5 00 |
| Holbrook, W. M., Trustee..... | 897 | 10,000 | | | 500 00 |
| Holbrook, W. E., Trustee..... | 898 | 11,000 | | | 550 00 |
| Holbrook, W. E., Trustee..... | 899 | 4,500 | | | 225 00 |
| Holbrook, W. E., Trustee..... | 900 | 4,500 | | | 225 00 |
| Holbrook, W. E., Trustee..... | 958 | 2,000 | | | 1 00 |
| Holbrook, W. E., Trustee..... | 959 | 2,000 | | | 1 00 |
| Holbrook, W. E., Trustee..... | 960 | 2,000 | | | 1 00 |
| Holbrook, W. E., Trustee..... | 974 | 2,000 | | | 1 00 |
| Holbrook, W. E., Trustee..... | 984 | 1,200 | | | 60 00 |
| Holbrook, W. E., Trustee..... | 995 | 1,000 | | | 50 00 |
| Holbrook, W. E., Trustee..... | 996 | 1,000 | | | 50 00 |
| Holbrook, W. E., Trustee..... | 997 | 1,000 | | | 50 00 |
| Holbrook, W. E., Trustee..... | 998 | 1,000 | | | 50 00 |
| Holbrook, W. E., Trustee..... | 999 | 1,000 | | | 50 00 |
| Holbrook, W. E., Trustee..... | 1000 | 1,000 | | | 50 00 |
| Holbrook, W. E., Trustee..... | 1001 | 1,000 | | | 50 00 |
| Holbrook, W. E., Trustee..... | 1118 | 2,000 | | | 100 00 |
| Holbrook, W. E., Trustee..... | 1119 | 2,000 | | | 100 00 |
| Holbrook, W. E., Trustee..... | 1123 | 2,000 | | | 100 00 |
| Kessling, E. L..... | 838 | 15 | | | 75 |
| Lucas, Mrs. T. R..... | 348 | 10 | | | 50 |
| McGuen, John D..... | 305 | 2 | | | 10 |
| McAllister, E..... | 1071 | 100 | | | 5 00 |
| Murray, Peter William..... | 70 | 1 | | | 05 |
| Niederost, August..... | 207 | 28 | | | 1 40 |
| Optiz, Conrad E..... | 348 | 10 | | | 50 |
| Peters, W. S..... | 60 | 15 | | | 75 |
| Peters, W. S..... | 331 | 500 | | | 25 00 |
| Peters, W. S..... | 672 | 5 | | | 25 |
| Pipher, Jos. E..... | 102 | 2 | | | 10 |
| Reynolds, Timothy..... | 21 | 5 | | | 25 |
| Schindler, Louis..... | 89 | 2 | | | 10 |
| Sheard, Mrs. Dora L..... | 920 | 100 | | | 5 00 |
| Smith, James B., Trustee..... | 985 | 1,000 | | | 50 00 |
| Smith, James B., Trustee..... | 986 | 1,000 | | | 50 00 |
| Smith, James B., Trustee..... | 987 | 1,000 | | | 50 00 |
| Smith, James B., Trustee..... | 988 | 1,000 | | | 50 00 |
| Smith, James B., Trustee..... | 989 | 1,000 | | | 50 00 |
| Smith, James B., Trustee..... | 990 | 1,000 | | | 50 00 |
| Smith, James B., Trustee..... | 991 | 1,000 | | | 50 00 |
| Smith, James B., Trustee..... | 992 | 500 | | | 25 00 |
| Tarpey, W. J..... | 675 | 70 | | | 14 |
| Waiser, Mrs. Lizzie..... | 882 | 125 | | | 6 25 |
| Young, Richard..... | 746 | 91 | | | 4 55 |
| Young, Richard..... | 754 | 167 | | | 8 35 |
| Young, Richard..... | 758 | 100 | | | 5 00 |
| Young, Richard..... | 761 | 328 | | | 16 40 |

And in accordance with law, and an order from the Board of Directors, made on the 26th day of March, 1901, so many shares of each parcel of such stock as may be necessary, will be sold at public auction at the office of said corporation, in Rooms 322-323 Parrott Building, San Francisco, California, on MONDAY, the 27th day of May, 1901, at the hour of 1 o'clock P. M. of said day, to pay said delinquent assessment thereon, together with costs of advertising and expenses of sale.

J. C. ANTHONY, Secretary.
Office—Rooms 322-323 Parrott Building, 825 to 855 Market St., San Francisco, California.

POSTPONEMENT.

By order of the Board of Directors, the day of sale of the above delinquent stock has been postponed to MONDAY, the 27th day of June, 1901, at the hour of 1 o'clock P. M., at the office of said corporation in Rooms 322-323 Parrott Building, San Francisco, California.

J. C. ANTHONY, Secretary.

Office—Rooms 322-323 Parrott Building, 825 to 855 Market St., San Francisco, California.

POSTPONEMENT.

By order of the Board of Directors, the day of sale of the above delinquent stock has been postponed to MONDAY, the 27th day of July, 1901, at the hour of 1 o'clock P. M., at the office of said corporation in Rooms 322-323 Parrott Building, San Francisco, California.

J. C. ANTHONY, Secretary.

Office—Rooms 322-323 Parrott Building, 825 to 855 Market St., San Francisco, California.

POSTPONEMENT.

By order of the Board of Directors, the day of sale of the above delinquent stock has been postponed to THURSDAY, the 15th day of August, 1901, at the hour of 1 o'clock P. M., at the office of said corporation in Rooms 322-323 Parrott Building, San Francisco, California.

J. C. ANTHONY, Secretary.
Office—Rooms 322-323 Parrott Building, 825 to 855 Market St., San Francisco, California.

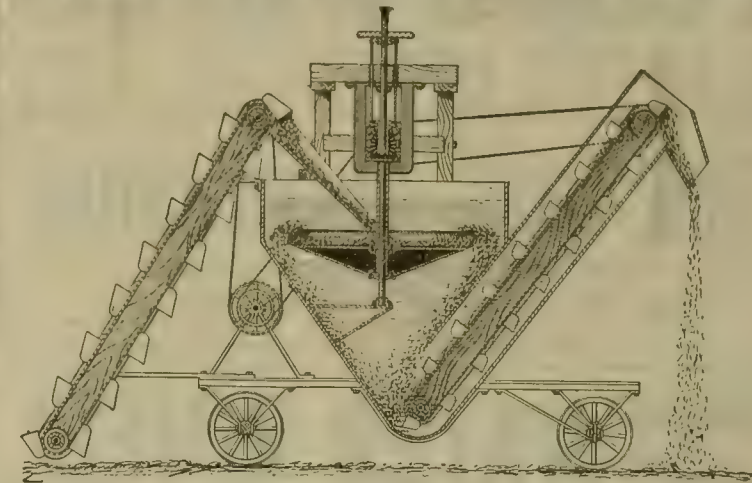
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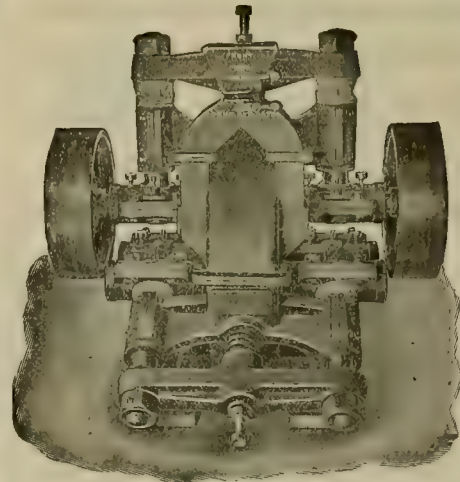
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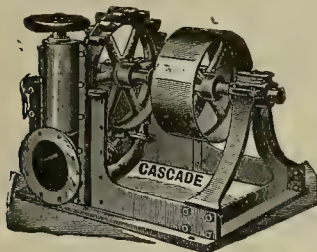
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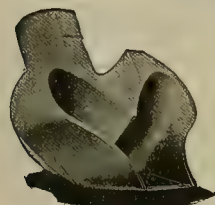
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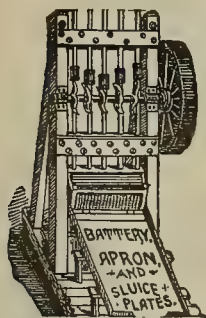
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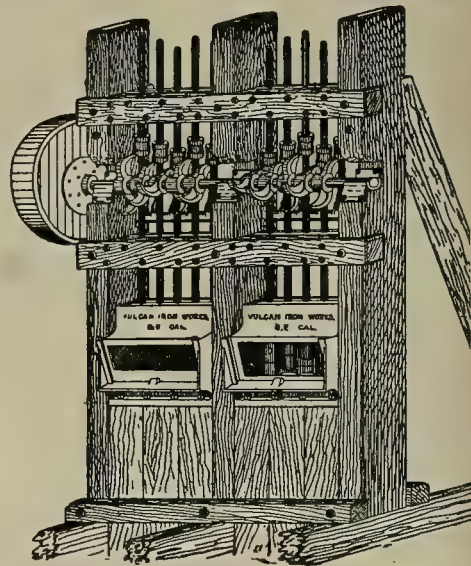
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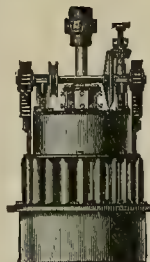
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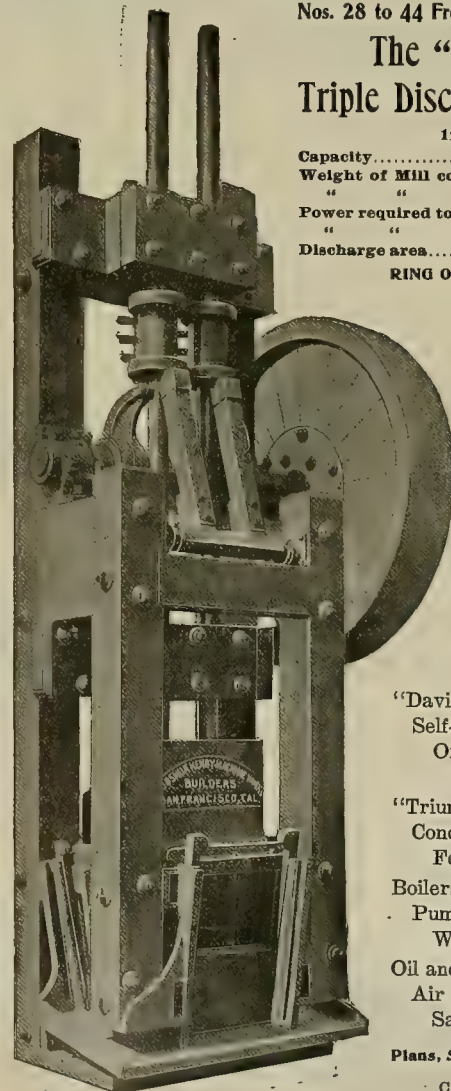
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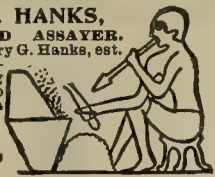
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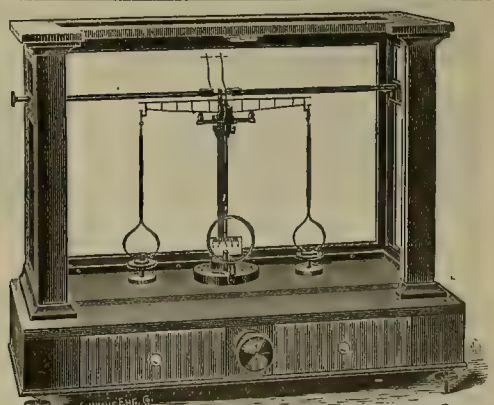
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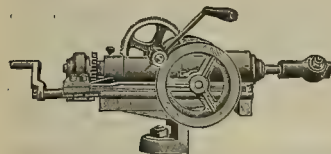
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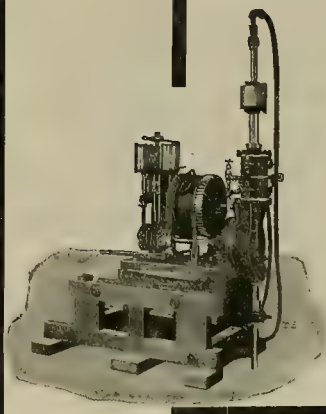
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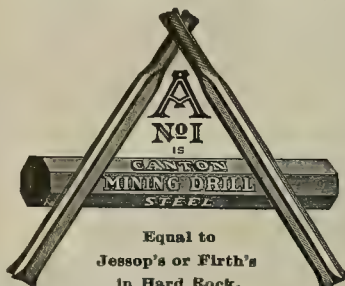
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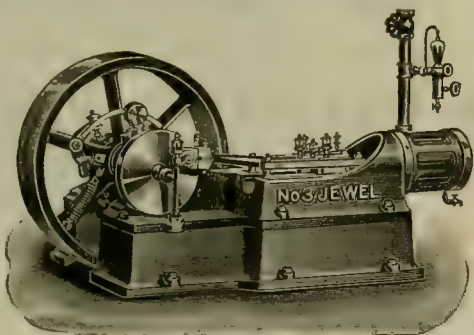
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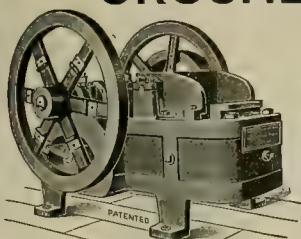
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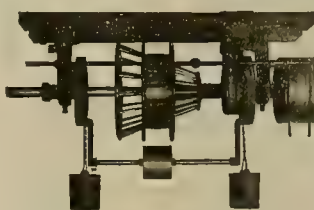
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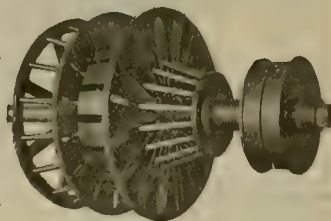
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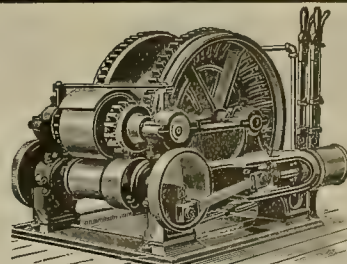


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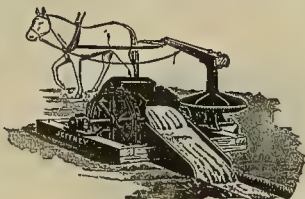


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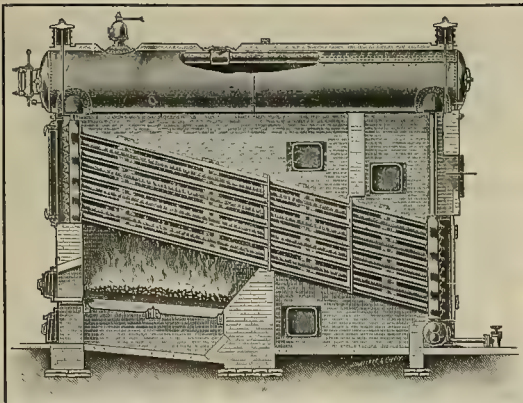
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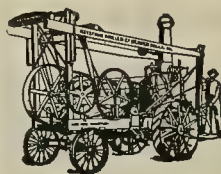
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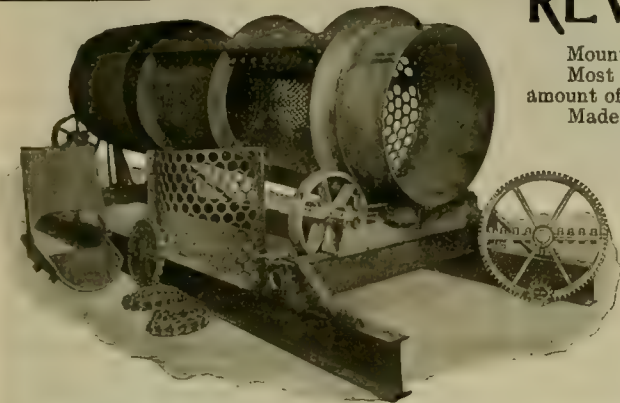


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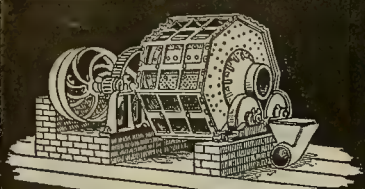
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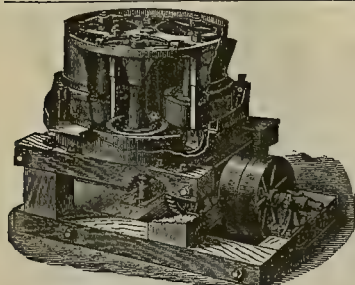
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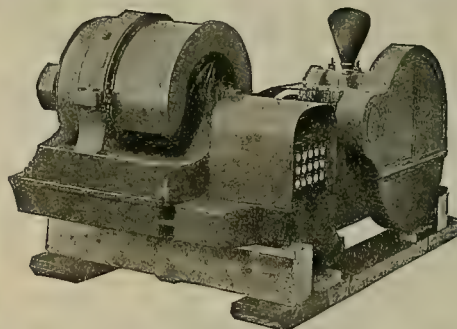
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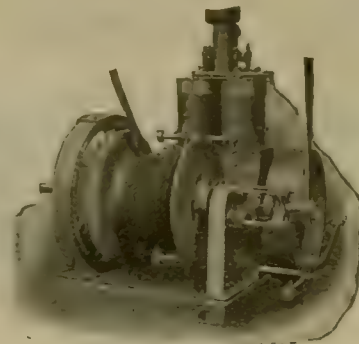
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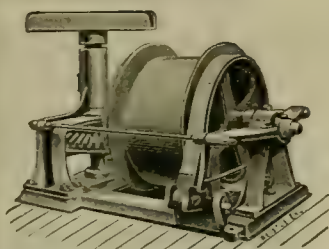
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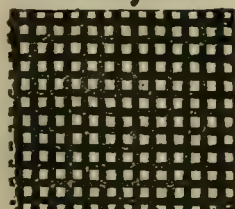
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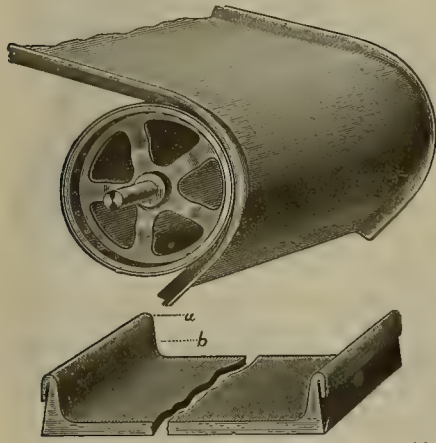
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By JOHN R. TREGLOAN, Superintendent.

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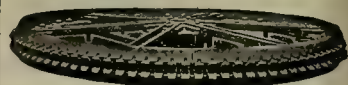
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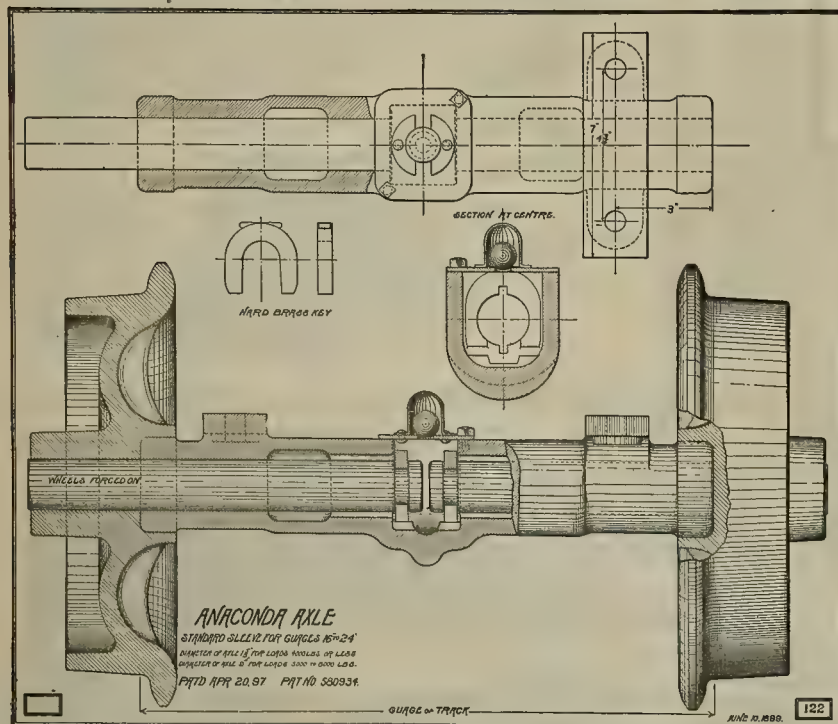


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The Reducible Item.

The steady pressure from the necessity of making savings and economies somewhere in the costs of metal production, to offset the steady downward tendency of metal selling prices, has been the cause of many improvements in the mining and metallurgical arts. The enlightenment that finds its birthplace in necessity, dealing with the economics of mining, has clearly defined the line of division between production and consumption to be on the production side of the ultimate consumer. Everything that the ultimate consumer pays in one sum is costs from his standpoint. This same sum regarded from the other end consists of many items of separate flat costs, and running with these separate flat costs, one or more separate items of profit.

In the development of the business of mining, each of these items has in turn been taken into consideration by the producer, and the effort made to make in it the maximum possible economy and saving, primarily to maintain or increase the profit margin against the constantly decreasing sale prices. What may be termed the trade handling of the metal by middle men between the last producer, who by labor or material added real value to the metal, and the consumer, who puts the metal directly into reproductive use as capital, has been more or less largely eliminated, and an economy of interest on capital made by shortening the time interval between the taking of the metal from the mine and its delivery to the consumer. The entire sum so saved increased the profit margin at first, but in the end the competition of increasing production tends again to the wiping out of the profit margin and forces additional economies and savings.

At the mine the mining costs have received material reduction through the improvement in methods and machinery by which capital, which has been becoming cheaper, is substituted for labor, which has been becoming dearer. The metallurgical costs have received an even closer searching for reducible items.

In the aggregate enormous savings and economies have been effected by the development of processes by which all the metals of one ore, or the several metals of several ores, interacting, become all reduced and utilizable, and by the constant improvement in mechanical appliances permitting, as with mining, the substitution of cheaper capital for dearer labor. The metal manufacturing arts, long regarded as entirely separate industries from the metal mining and metallurgy, have been added to and combined with the latter to secure further savings and economies. Notably is this so in iron, in which the single

business now comprehends every step from the ore, fuel and flux in the ground, to the finished, finally consumable article. The same development is beginning in lead mining, in zinc mining, and in copper mining.

The marked feature of the economic changes in every item of these savings and economies in metal mining is the substitution made of cheap capital for dear labor. The labor cost, irrespective of the rate of wages, has not only been kept down, but it has been diminished. There has been a constant tendency to the cheaper production with the higher wages. What was observed long since as a law of English industry generally, has proven particularly true of the mining industry, which is distinctively American.

While it is by no means to be assumed that the limit of saving and economy has been reached in the general items of cost considered above, the margin of such saving and economy has been reduced well down to its ultimate minimum, and it would seem as if the one remaining general cost item—transportation—was "the reducible item" of the cost of metal production. The problem of freight cost in metal production is not new, and it cannot be said to be unstudied. Yet it has been an item, that, perhaps more than any of the others, has seemed a direct cost charge on the consumer rather than on the producer. The latter has only exceptionally given it the effective analysis that has brought results in savings and economies. In the iron industry and in the petroleum industry this has been done with exceeding skill and success. In the general metal mining industry, however, transportation remains what may, to the practical exclusion of all others, be termed "the reducible item." The consolidation of mining businesses has reduced time between production and consumption as a cost item. Invention and better technical skill have reduced the waste of material and labor cost items. There yet remains to be accomplished the reduction of space between production and consumption as a cost item.



Locomobiles in Golden Gate Park, San Francisco, Cal. (See page 67)



Locomobiles in Automobile Club Run at Sutro Baths, San Francisco, Cal. (See page 67.)

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San Francisco, August 17, 1901.

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THE Selby Smelting & Lead Co. of San Francisco have been exceedingly fortunate in the prompt catching of the thief who stole the \$280,000 of gold bullion early last week, and in the recovery of the gold. It appears that the robbery was the work of one man, an ex-employee. The stolen gold bars were cached by him in shallow water at the Vallejo Junction wharf, a short distance from the smelter. Confronted with strong circumstantial evidence, the robber finally confessed and indicated where he had hidden the gold which has since been recovered. Much of the credit for the discovery of the thief and the recovery of the gold is due to the energetic well-directed work of Mr. Alfred Von der Ropp, the superintendent of the smelter. Many detectives working on the case, stimulated by the high reward, made short work of its seeming difficulties, and will be well repaid for their success. For the Smelting Company the robbery has become an incident. Its business is going on exactly as if there had been no robbery.

It is reported that the last contract for water-wheel equipment for extensions to the Niagara plant has been given to a Swiss firm of engineers, presumably after a competition as to price with American manufacturers. The significance of the fact seems to have been overlooked. It is only one contract, but it would seem to indicate that the United States has not the uncontested lead in metal working it believed it had. The foreign bidder had the handicap of a high tariff, more costly material and freight. It will hardly be contended that wages which are in Switzerland not much below the American standard will offset this great handicap. Some of the difference must have come out of profits, the Swiss bidders being satisfied with less than the American. The incident is worth the consideration of our American metal manufacturers. Is or is not the attempt to get high profits driving away business from its natural channels? It has been notable in recent years the closeness with which competing bidders in metal constructions in the United States could figure their competing bids. In metal work now nothing has to be left to chance or guessed at. Yet incidents similar in kind to that of the Niagara water-power plant construction are not infrequent. Only recently bids being asked for a large stamp mill in California, the local manufacturers were underbid approximately \$100 a stamp head. There would seem to be no reason for such a great difference in heavy metal manufacturing unless it is in the respective ideas of what is a profit on metal working.

The Price of Copper.

The present price of copper—16 cents to 17 cents a pound—has been maintained for over thirty months. The question of the continued maintenance of the price is a matter of considerable importance to copper miners. The present price has not been fixed by the cost of production, but quite independent of it. The price was rapidly advanced in 1898 by men controlling a minor fraction of the production, but who appreciated earlier than other men in the business the commercial conditions. The consumption of copper for a number of years previously had been increasing more rapidly than current production without affecting the price. The use of the metal was promising to extend even more rapidly. The real commercial conditions which the men controlling a minor fraction of the production were the first to see, once the price of copper was advanced, could be seen by anyone. The question that is vital relates to the future maintenance of the present price or a figure approximating it.

The present price has been maintained for a period sufficiently long for it to develop its influence on production. Briefly stated, European mines have decreased in production and no new mines have been discovered. Mines in Asia, South America and Australia have not increased their production and no new mines that promise material increase in production have been discovered. Russia and Siberia undoubtedly contain copper deposits, but their utilization commercially is certainly ten years away—perhaps more.

In North America copper production has increased in the aggregate. A very large number of new operations have been undertaken and some are beginning to produce. Other new operations are being projected. The old established mines, excepting only those of Michigan, are the ones, however, that so far have made the great gains in production. The Lake Superior region has not developed anything in the way of richer deposits as a result of the increased energy of exploration. Poor deposits have been opened up for more extended working, and at present prices can increase production. Lower prices will wipe out profit margins which have been created solely by the higher prices, and the net result to the district will be a diminished production. In other districts in the United States, in Alaska, in Mexico and in British Columbia the gain in production is more permanent and established and will be less affected by a decrease in price. There are several reasons for this. Many new bodies of copper-bearing ore of enormous extent have been discovered. Other large deposits, supposed unworkable, have yielded to improved or different methods. The cost of treatment of sulphide copper ores has been reduced. More important, the ores all carry more or less recoverable gold and silver. Frequently the amount is so large that the recovery of the copper is paid for by the value of the gold and silver recovered. This element of value in gold and silver content should not be overlooked by investors in copper mining. The same condition that every other metal has had to meet—overproduction—copper cannot escape. The constant industrial and commercial tendency, toward the equalization of the margin of profit in all industries, will ultimately affect copper production. With a gold and silver yield from his mining paying the costs of production of the copper, the miner is insured against loss. Ultimately the principle of the survival of the surest paying mines may limit copper mining to these ores.

The production end of the copper industry seems, on the review of the mines of the world, safe to keep prices at their present high figure. Increase in production in North America for some years to come it would seem probable will be partly compensated by natural decreases in other countries, and partly by new uses for copper continuing to increase.

The weak point for the maintenance of prices is, it would seem, rather to be looked for at the consuming end of the industry. While uses for copper are extending, the high price of the metal is a constant stimulus to search for substitutes. The great use of the metal is in wire for electrical work. At the present price of 16 cents to 17 cents a pound, aluminum costing 35 cents a pound has been found commercially available as a substitute for copper. The

cost difference is not a large amount at these figures. A drop of a few cents a pound in copper would make aluminum much the more costly. But, on the other hand, cheaper aluminum would mean the immediate substitution of it for copper in wire for electrical work. Here is the danger point to the copper price. There is considerable room for a drop in the cost of production of aluminum. The cost of aluminum production by the present electric method is reasonably to be considered its minimum. Some other method may be developed that is less costly. This is, in fact, claimed at the present time by an inventor, who states that, on an experimental scale, he has produced aluminum at a cost not exceeding 7 cents a pound. If the claim be made good commercially, it is easy to see that aluminum would be the commercial substitute in electrical work for copper with the latter down to 5 cents or 6 cents a pound.

The reduction in consumption of copper by the use of aluminum for electrical work could not fail to reduce the price some and cut down production from some mines. On the other hand, a reduction in price would bring the cost of the metal within reach for many purposes for which steel is used now. So that while no sweeping down of copper prices is to be anticipated, it is good business for copper miners initiating new enterprises to consider them in advance on the basis of prices for the copper materially less than rule at present.

THE rapid increase of mineral production, under the stimulus of high profits from increased consumption during the last half dozen years, has quite generally resulted in wiping out much of the first high rates of profit, through production in its turn exceeding consumption. Producers, in order to sustain prices, besides the ordinary method of restricting production, now becoming increasingly difficult, are in many lines working to increase consumption. Zinc producers of Missouri and Kansas are experimenting with the manufacture of zinc shingles. It is a new use, but if they can be commercially manufactured it means the establishment of a new use for zinc that will absorb a large amount of production. Petroleum is being brought into domestic use in Oakland, Cal., as a substitute for coal. It is found more economical than the latter, and its general use, besides the economy to the users, will provide a steady consumption that will raise the sale price of the California production. The present price of petroleum at San Joaquin valley wells, 25 cents a barrel, could be trebled before it would call for a rise in the present retail price of the oil, \$2.50 a barrel, to Oakland consumers. The California fuel oil price problem is a comparatively local affair. The zinc production price is a matter of more general moment. The principle applied to sustain the price to producers is the same. Lead prices to producers already necessitate for that metal some of the same treatment through the originating of new uses by the producers.

OCCASIONALLY the comparison is made that some particular mine produces annually more gold or other metal than some other newer State or Territory which for the time is attracting the attention and money of the public. The object of the comparison is to suggest the argument that the particular spot where the one mine is, is better as a field for mining investment and enterprise than the newer territorial area with which it is compared, to the intended disadvantage of the latter. The argument intended to be suggested is not sound. In the first place, the single mine represents, ordinarily, many years of a past life, during which the facilities for its metal production have been created, and during which the adjacent prospects and abandoned claims that failed have been forgotten. Time is an essential element in the making of production of any mine or district. In a mineral bearing country the chances for big mines, large producers for long periods of time, are increased in proportion to area. It is not unreasonable to infer that the same time given to the development of the newer territory will produce the same desirable result as exists in the older. The attention and money of the public go to the newer district because the chances it offers for personal gain are believed to be the better. Other people are more or less correctly believed to have all there is of gain to be obtained in the older district of the great mine.

Concentrates.

THE energy represented by what is termed the friction head of the water flow in a pipe is dissipated as heat.

IN the California oil fields the topography seems to have little or no effect so far as the workable value of the deposit is concerned.

IN stamp mill practice one way of obtaining a high duty per head is by throwing all possible of the work of crushing on the rock breaker.

THE lead production of British Columbia, sold at London prices and finding its market in the ore in Europe, is compelled to pay half of its value out in freight charges.

AFTER using No. 1 powder to spring holes for blasting the hole should be washed out before loading another charge into it in order to avoid the danger of an explosion through ignition by a spark left by the first shooting.

THE Supreme Court of California has lately ruled in a case coming on appeal from Tuolumne county that where there is no penalty attached for the violation of any local rule or regulation of a mining district, it does not vitiate a location.

THE windlass and bucket as a means of taking spoil out of a mine shaft are practically unknown in Siberia. The miners in working out through a shaft shovel the spoil from one platform to another in the shaft, 4 or 5 feet at a lift, till the top is reached.

TO WELD small shafting in a blacksmith forge: Upset the ends to be joined and split each down far enough to put in a double wedge piece; put all together in a hot fire, driving together while soft in the forge; work on the anvil with top-and-bottom swages.

TO WELD malleable cast iron or malleable cast steel, a good flux is composed of equal parts by weight of pulverized borax and cast steel filings, thoroughly mixed and used in quantity. The anvil should be heated up to 150° F. or more to prevent the chilling of the metal by contact.

THE easiest and most economical way to increase the horse power of an engine is to increase the steam pressure in the boiler, provided always if the boiler will stand the increase. Every added year of life of a boiler reduces by a measurable quantity its ability to withstand pressure with the proper safety factor.

AS A substitute for a windlass, a hand winch is frequently desirable in sinking shallow shafts. A good ratio between the pinion and the gear is a 5-inch diameter for the former and 12 inches for the latter. There is no uniformity in practice—either 3 or 4 inches for the pinion with 12 for the gear being indifferently used.

"CONCENTRATES" is largely attempts to correctly answer questions weekly received and state minor technical details of engineering, mining and metallurgical practice. Many novelties in detail of mechanical construction or detail of operation are being originated by miners and mill men that are useful general information.

STEEL WOOL consists of sharp-edged threads of steel, which curl up like excelsior, though finer. The various grades are used as substitutes for sandpaper in smoothing and cleaning surfaces for painting or varnishing. The steel wool for moldings and irregular surfaces is superior to sand paper, as it fits into crevices and irregular surfaces better.

IRIDOSMIUM is worth from \$6 to \$10 per ounce, according to quality. Iridosmium is tin-white in color, heavier than gold, occurs usually in small scales or grains, which in panning hang back of the gold. When concentrates are used, the very fine metals often hang behind in streaks, which in mass are of a brownish-red or leaden color and creep along the concentrator.

THE temperature to which drill steel is heated before tempering may or may not affect the temper. It depends somewhat on the steel itself and somewhat on the rapidity of cooling from the heat temperature to the temperature at which the tempering is begun. Different steels require to be worked under the hammer at different heats, some at white heat and others at as low a temperature as possible.

THE smelting ores of the Le Roi and other Rossland, B. C., mines contain less than 1.3% of copper, the chief value being in gold. These ores are not given any preliminary wet concentration, but are roasted and smelted to a copper matte. The smelters, in settling for the copper, do not deduct 1.3% flat from the wet assay determination, as that would leave no copper for the mine. The practice is to pay for 70% of the copper as determined by wet assay. Actual losses in smelting are found as low as .2% and not exceeding .3%.

THE United States courts have made a ruling that where a foreign corporation was the real owner of a mining claim, a patent, obtained to it by a citizen of the United States for the use and benefit of the foreign corporation, through false representation to the U. S. Land Office that the citizen was the owner of the mine, is void. The foreign corporation does not, however, forfeit the mine, but is compelled to do assessment work on it just as if no patent had issued. A failure to do the assessment work forfeits the claim and it is then locatable.

ORDINARY cast iron can be welded, though the term

united is more exactly descriptive, as the pieces are joined by a process of casting, rather than by hammering together. Numerous holes are bored in the pieces to be united and they are secured together. About the break is placed a quantity of pig iron filings, wrought iron filings, steel filings and borax to form a flux. Lute with clay to hold the metal and heat in forge until the filings melt and fill all the cavities. Let it remain in the fireplace until thoroughly cold, when it can be removed and cleaned.

WHERE an agricultural or railroad patent has issued to a tract of land which, at the time the land was filed on or the grant attached, was known to contain a lode of valuable mineral, the patent does not take the lode and it remains locatable. The limit of width of side ground that could be taken by location would seem to be only 25 feet on each side of the center line of the lode. The patent obtained under such conditions would have been based on fraud, and void as to the lode, which should have been excluded from the patent by a segregation survey.

IN starting a fresh drill into a hole already started it should be struck lightly with the hammer until the bit is seated true in the bottom of the hole. The corners of the chisel edge of the drill round off as it is used so that the bottom of a hole is not up to the gauge of the bit of the fresh drill, which then seats on being put in only on the corners. Striking the drill hard when the chisel edge is not full seated is apt to split off the corners and may break the bit off entirely. Striking light blows chips off the rock under the corners till the edge seats full on the bottom.

THE water from a copper mine, where it contains not less than .05 of 1% of copper, should pay under treatment for the recovery of the copper. This small fraction of a per cent is .000425 pound of copper to one gallon. A miner's inch of flow of water daily would contain 68 pounds of copper, which would be recoverable as copper cement by the consumption of 112 pounds of scrap iron. The copper cement, at 12 cents per pound, would be salable for \$8.16. The cost of the scrap iron should not exceed \$1.12, thus leaving about \$7 a day as the net value recoverable from 1 inch of mine water containing .05 of 1% of copper.

THE payment of 95% of the assay gold value of ore, reckoning the gold at \$20 per ounce, is a payment of only 91.92% of the actual coinage value of the gold. Some smelters pay higher percentages for the gold when the assay runs over two ounces to the ton. As much as 98% on the \$20 an ounce valuation is paid where the ore contains over five ounces of gold to the ton. This 98% is 94.84% of the coinage value of the gold. Even with this there is a profit margin in the difference which with five-ounce ore amounts to \$5.35 a ton of the ore as compared with \$3.25 a ton of the ore when it only carries 1.95 ounces per ton.

WHETHER or not liquid chlorine will serve the purpose of chloride of calcium in bleaching can be best determined by experiment in a special vessel. The chlorine in 160 pounds of the chloride of lime weighs 100 pounds. The chlorine gas is the bleaching reagent. Liquid chlorine is chlorine gas compressed at a pressure of 200 pounds to the square inch. It is put up in steel drums which weigh gross 300 pounds and contain 115 pounds of the liquid chlorine. A drum is 5 feet long and 10 inches diameter. Liquid chlorine is supplied by Mariner & Hoskins, 81 Clark St., Chicago, Ill.

REFERRING to a milling test of ore from a mine, a "mill run" and a "mill test" are not precisely the same thing. The "mill run" refers to the total ore crushed during the usual commercial time interval between battery clean-ups. At the least, it is a test of a number of tons of ore under commercial conditions. The "mill test" is a laboratory experiment following the sequence of operations and methods of a mill run, but without the appliances and using only a few pounds or hundred-weight of the ore. The results obtained in the laboratory are not necessarily conclusive as to what the commercial mill run will accomplish.

THE Supreme Court of California has ruled that if work is resumed on a mining location but not completed to the amount of \$100 before the first of January arrives on which forfeiture would occur, the claimant by continuing the work into the new year, and working continuously until the \$100 value of work is completed, protects the claim against forfeiture. It is not required that assessment work shall be done on Sunday to make the work continuous, as contemplated by the statute. The work so performed, however, is only valid for the year it was commenced and does not count for the year in which it was completed.

BABBIT METAL, as originally made, is an alloy composed of eight parts refined antimony, four parts copper and ninety-six parts tin. Ordinary soft lining, called babbit metal, is frequently made of four parts lead and one part antimony. Old type metal used for lining consists of two parts lead and one part each of tin and antimony. Frequent heating results in changes of the ratio of the metals in the alloy, oxidization going on at different ratios. To prevent oxidization, protect the melted metal from the atmosphere. A covering of dirt will do. The coating of oxide that forms first is some protection. Pulverized charcoal, with a little salt and soda, is perhaps the best protection.

THERE is no difference in economy of use between corresponding grades of American and English drill steel. In drill steel the miner can depend on getting just what

is paid for. The differences between drill steels are frequently due to nothing but the conservatism of the mine blacksmith, who only knows one brand of steel to be good—all others are bad. The real difference between two drill steels can be measured by use. The same drillers in the same mine opening should have records kept of the number of inches drilled, and of the number of drills sent to the shop. From these two records the average number of inches drilled by each drill of the lots compared can be determined. The steel that averages the greater number of inches drilled per piece is the best.

TO COOL WATER by compressed air, take the cold, expanded air after it leaves a cylinder in which it has performed work, and conduct it through a pipe or coil of pipes immersed in the water, to be cooled before discharging it into the atmosphere. Another method is to discharge the air from the cylinder through a chamber holding vessels containing the water it is desired to cool. Ice can be made by either of the simple means suggested. Compressed air which has not done work in a cylinder, but is simply released into the atmosphere through a valve, in expanding does its work in friction against the atmosphere into which it is discharged, and this energy is almost instantly converted into heat. No cold can practically be produced in this manner. In expanding in a cylinder under load, the compressed air at the atmospheric temperature doing work uses up heat to a corresponding amount, which is not replaced through the walls of the cylinder. It has thus a temperature when discharged less than the temperature of the atmosphere, and proceeds to absorb heat from the nearest bodies containing it. These bodies thus have their temperature in turn reduced. This is the principle applied to cool water or make ice, as desired.

JUST what causes checking or cracking in drill bits is hard to say in any particular instance. Sometimes it is the blacksmith; other times the water used for tempering and cooling. A third set of causes, however, is undoubtedly in the steel itself, due to defects in the manufacture. When a piece of steel is heated red hot and plunged into cold water to temper or cool, tremendous strains are set up within it. The outer portions are cooled instantly, and, of course, shrink, the still red hot interior portions yielding to allow this. But when the interior portions of the piece cool and shrink, the hardened outer portions resist the shrinkage, and stresses are set up in the piece that it yields to, either gradually or all at once. If the latter, the steel cracks and breaks soon after being withdrawn from the water. With this the original quality of the steel seemingly has much to do. Each particular grade requires its own special handling to get the best results and avoid the inherent weaknesses. To prevent the cracking, the effect of plunging in the water should be tested with the steel at different temperatures when plunged, and tested with different degrees of chilling before removal from the water. Careful testing will most likely discover the position of the weak point in handling and suggest the treatment that will avoid it.

THE problem of concentrating native quicksilver from a soft shale or schist—the former rather than the latter, as the phenomena of metamorphism which would have made the latter from the former would have closed it against free quicksilver—depends to some extent at least on the physical condition of the native metal in the rock. In California many of the mercury-bearing lodes are on the contact line of the older metamorphic rocks with younger sandstones and shales, which unaltered, contain more or less bituminous oily matter. The original mercury mineral was in these localities most probably cinnabar. Native quicksilver is most probably the result of a natural secondary distillation of the cinnabar. The heat which would disassociate the cinnabar and sublime the quicksilver from the sandstone or conglomerate, where the cinnabar was deposited, into the shale could be produced from several natural sources: the oxidization of pyrites in the shale for example. The same heat that sublimed the quicksilver would distill the bitumen in the same formations and both could and probably did deposit together. The minute globules of the metal could thus easily become more or less fouled by the bitumen or oil in the shale and will not run together and collect by washing. If the shale or slate contain a commercial quantity of the metal and it is in this condition, fouled by bitumen, the method of roasting and sublimation would seem best to be adopted. It would seem as if a continuous operating furnace could be devised for this ore-bearing native metal, which distills over at a lower temperature than the metal from cinnabar. If a wet method be possible for the concentration a very thorough preliminary testing is necessary to determine the place in the rock of the metal. If wholly in the seams, it may be that bank blasting will free it so that the deposit can be economically handled by hydraulic lifting through sluices and undercurrents. The larger the rock fragments can wash and give up the quicksilver the better. Slumming or sanding of the wash would carry off the metal. Undercurrents should be provided with as low a grade as the nature of the material will permit, and with mechanical arrangements to prevent the riffles from packing or sanding. The sluices should not be expected to make much saving. If the quicksilver is in the body of the rock a mechanical crushing before washing is indispensable. Anyway, after all "Concentrates" can say, the problem is still one only to be finally answered by the engineer who has the opportunity to examine the deposit.

Vein Definition.

In the recent trial of the Pennsylvania G. M. Co. vs. The Grass Valley Exploration Co. litigation in the U. S. District Court in San Francisco, over conflicting claims to a mine at Grass Valley, Cal., Ross E. Browne, mining engineer, as an expert witness gave testimony for the Pennsylvania people relating to the geological questions involved. In the number of this paper of August 3 a general statement of the case is made. A summary of the opinions and definition of the lode phenomena as they are as interpreted by the expert geologists' witnesses for the Grass Valley Exploration Co. will be given later. The following is a summary of the definitions and opinions submitted by Mr. Browne in his language as given in the course of his testimony, together with copies of the diagrams made to illustrate the definitions:

Synonymous Terms: We all realize the importance of using the terms lode, vein and ledge synonymously as used in the Acts of Congress, but it is difficult for the miner to avoid reverting back to older customs, and he very commonly speaks of different seams of quartz in the same lode as separate veins—e. g., as the foot wall vein and the hanging wall vein, maintaining, at the same time, that they are both within the boundaries of a single lode or vein formation.

It is owing to the lack of precision among miners, and to local differences in phraseology, that there arises so much confusion in definitions.

Ideal Type: The ideal type of vein is a plane fissure in the country rock filled with ore-bearing material. But it is well known that complications are the rule, and this definition is altogether too narrow for general use.

Mineralized Zone: A current definition of more recent date is "any mineralized mass of rock in place lying within clearly defined boundaries," or, still more recently stated, "within definable boundaries." This definition, like all others, is understood to permit the inclusion of so-called horses or masses of unmineralized country rock, partly surrounded by branches of the lode. This is a pretty broad definition—it does not prescribe the element of fissuring, and is more liberal than required to describe the Pennsylvania vein.

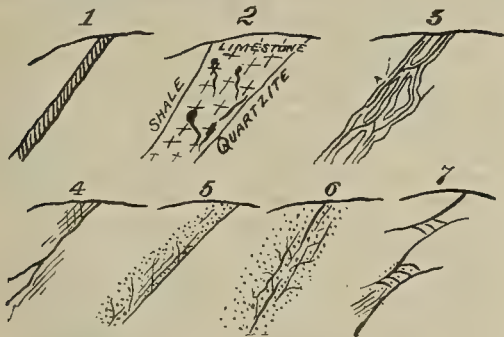
Complex Fissure Vein: The vein, as we commonly find it, is more fittingly described as the ore-bearing filling of a single fissure or of a system of interconnected fissures in the country rock. It may be complicated by the attachment of irregular ore bodies due to impregnation or metamorphism of the wall rocks, or to the filling of cavities other than fissure openings. It must culminate in its upward course in a single apex. It must preserve its identity throughout, and this means that it must maintain its continuity unless interrupted by subsequent faulting.

Boundaries: There must, of course, be boundaries or lateral limits to the lode. These may be regular or irregular in form.

Examples of regular form we find in the foot and hanging walls of a single fissure vein, or of a mineralized zone with sharp changes of formation on either side.

But such walls are not essential to the existence of a lode. For example, the irregular forms of impregnation and replacement veins often have for their boundaries the somewhat indefinite limits of mineralization.

A complex fissure vein has many walls, and may have either simple or complex boundaries, according to the structural outline.



- (1) Regular boundaries—plane fissure. (2) Regular boundaries—mineralized belt. (3) Fairly regular boundaries—complex fissure vein. (4) Irregular boundaries—complex fissure vein. (5) One regular, one indefinite boundary—impregnation or substitution vein. (6) Two indefinite boundaries—substitution impregnation vein. (7) Complex boundaries—complex fissure vein—Pennsylvania vein.

PENNSYLVANIA VEIN.—In the case of the Pennsylvania vein we have the complexity of fissuring. There is also some ore in the included masses of country rock due to impregnation. These masses have been altered and softened by percolating waters, and are traversed by many small fissures filled with ore-bearing material, constituting irregular ore bodies.

I imagine that the values are mainly in the small fissure fillings. However, it matters little what the values are due to; there have been large masses of such material stoped in this section.

There are no complications in other respects.

No Faulting: There is no complication due to displacement or faulting; the original continuity of the fissuring is still maintained.

No Intersections: There are no complications due to the intersection of veins. All branches are apparently contemporaneous in origin, and when they come together they form junctions like the confluence of the forks of a river.

A possible exception to this rule may be noted in connection with the so-called crossings. They constitute a series of small, almost vertical fissures crossing and cutting through the east and west dip fissures on entirely contrary courses. They are small and barren, as a rule, carrying frequently a little clay and rarely a little quartz. In no case that I know of has one of them been mined for ore in the Pennsylvania mine. Their effect on the vein is somewhat obscure. They do not fault the vein, but frequently the vein bends and steepens a little in passing through them. I shall not attempt to attach any significance to these crossings.

Country Rock: The country rock of the ground in dispute is wholly granodiorite—a rock very similar to granite. For all practical purposes we may call it granite, as the miner does. We may, then, add that there are no complications due to changes of formation.

Definition of Pennsylvania Vein: The Pennsylvania vein may now be defined as the filling of a complex of interconnected fissures in a homogeneous mass of country rock, the various parts being of contemporaneous origin and culminating upward in a common apex.

This vein apexes and continues downward several hundred feet, as a comparatively simple fissure vein; thence downward it grows more complex, but persistently maintains its identity. It is, apparently, more simple again on the bottom level.

Common Apex: The term "common apex" requires explanation in connection with my designation of this complex mass as a single vein or lode. Referring to the red color on the model representing the Pennsylvania vein, I am strongly of the opinion that, starting from any important point of development on the lower levels, a branch of the vein is traceable upward along a continuous line of mineralization, or of vein matter, through underlaps, east dippers and overlaps, to the Pennsylvania apex. It is not always possible to make such tracings through the present openings. There would be required a ruinous amount of dead work to enable such a thing, but the continuity is pretty generally indicated where the development is wanting.

There is one section of the mine where for a short distance we must go downward on an east dip in making the tracing to the apex—600 stope. But even here I believe that more complete development would disclose an upward connection with the overlap.

Departing Seams: There are many fissures or seams departing from this main line of ore bodies on divergent courses. These weaken and pinch out, or, if not sufficiently developed to exhibit this as a fact, the indications are definitely that way. These departing seams most commonly dip downward, or, if they start upward, they are apt to turn over and ultimately dip downward. Still, there are doubtless some of them which persist in an upward course, and, dying out in the country rock, have blind apices of their own. I must, therefore, explain that in speaking of the apex of the vein I treat these as insignificant offshoots or spurs, and not as separate branch veins.

THE EAST DIPPERS.—These east dippers, or east droppers, have about the same strike as the west dip fissures, but a contrary dip. They characteristically

connect two west dip fissures without cutting across either. They flow from one to the other. In no case



that I have seen do these east dippers cut through a strong overlap or underlap west fissure.

Steps: A striking feature of this mine is the part these east dippers take in leading to a stepping down from an overlapping to an underlapping west dip fissure. It is an unusual occurrence, so far as my experience goes, but there is nothing strange about it, any more than in many other cases. It is the natural result of the lines of weakness and the lines of strain; hence the lines of fissuring in this particular section.

There are certain sections of the mine where, if we follow the main fissure downward on its westerly dip, we find it flattening, weakening and pinching out; but, before pinching, there fall from it a series of east-dip fissures which connect below with an overlapping west-dip fissure. This underlap flattens, weakens and pinches out on its upward course, but on its downward course it strengthens and becomes a strong ore-bearing vein.



Step Faulting: The stepping down of veins by means of a system of step faulting is a familiar occurrence in some mining districts.

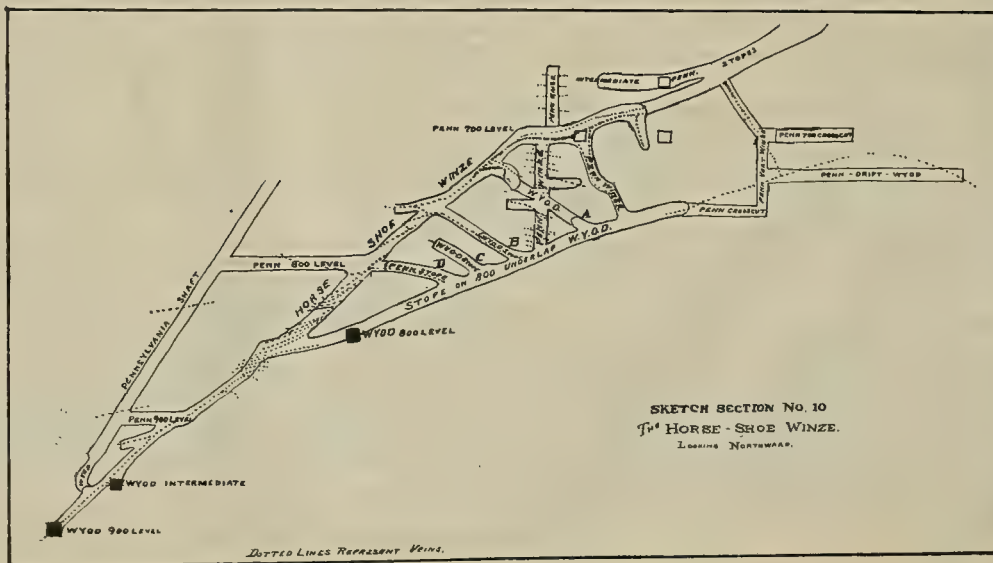


In that case the vein is cut by a series of later fissures. The masses of country rock slip on these later fissures and displace or fault sections of the vein. Such an interruption of the continuity often leads to difficulty in establishing the identity of the parts.

But the case we have in hand, although perhaps somewhat similar in effect, is very different structurally. There is no faulting in the Pennsylvania section; no displacement of the country rock. The channel through which the mineralizing solutions passed is simply complicated by this network of fissures. Its continuity as a channel is not disturbed; the continuity of the vein is definitely maintained.

Stop Sections: The following sections, Nos. 1, 2 and 3, taken at points shown on the map and model, will illustrate the actual detail of this stepping down of the vein.

Horseshoe Section: I will now refer to a section where a similar occurrence is repeated on a larger scale. I refer to the horseshoe winze section of the Pennsylvania 700 level down to the W. Y. O. D. 800 and below. This is where the two companies came directly in conflict in the stoping of large ore bodies. The overlapping fissure of the Pennsylvania vein has been stoped downward to a point where it flattens and pinches out, leaving a number of large east dippers and innumerable small streams which carry the quartz down 40 or 50 feet or more to a large underlying west dip fissure. This underlap fissure again shows



the same characteristics as in the smaller sections already exhibited. It flattens on its upward course and weakens to a barren seam. It strengthens on its downward course and becomes the great ore-bearing fissure of the lower levels. In the section between the overlap and underlap there is such a complication of east and west dip seams that a considerable part of the intervening mass constitutes a body of low-grade ore. How much of it contains value to pay the expenses of mining and milling I do not know; I made no tests to determine this. A part of the included masses is impregnated with sulphurets, which doubtless contain some gold independently of the quartz seams, though I presume they are poor.

The channel and the vein are continuous through this complex of fissures; the ore can be tested—in fact, it has been stoped continuously along various lines from the overlap to the underlap fissure; the lines are zigzag, but without a break.

This underlap fissure in its upward course, the moment it leaves the east dippers connecting with the overlap, ceases to carry any ore or quartz. It continues as a barren seam in hard country rock, flattens and weakens as far as pursued. It is about the shape of the inverted bowl of a spoon, and rolls from a west to an east dip.

In my judgment, it will gradually pinch out if followed much farther; in fact, it was followed upward on one dip line to a point where it joins a flat east or north dipper and pinches out absolutely.

THEORY OF FORMATION OF THE VEIN.—Regarding the theory of the formation of these veins, I do not think it of much importance—the facts as we find them concern us more directly. However, it may be well to give in outline what I adopt as the currently accepted theory.

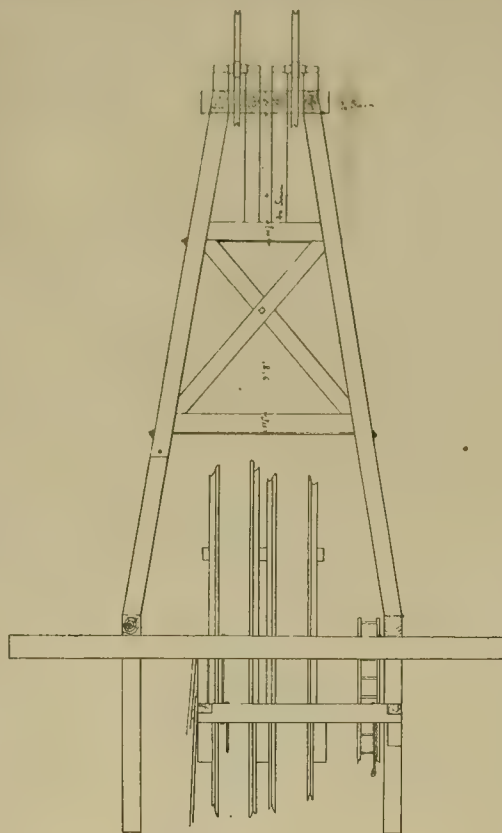
The country rock was first fissured and fractured—some of the fissures reached to great depth, and tapped a deep-seated source of mineralization, from which solutions arose, circulated through the fissures, deposited the quartz with its gold contents and finally escaped to the surface.

In some recently published discussions on the subject, I note the claim that descending and horizontally circulating waters often take part in the formation of the vein. But it makes little difference whether wholly ascending or partly descending, once conceive the mineralization to be due to the circulation of solutions through the open channel prepared by the complex fissuring, and there is no more difficulty in recognizing the complex than the simple portions of the deposit, as inseparable parts of the vein as a unit. Concerning this unity it seems to me the only legitimate question is? "Do these interconnected parts apex separately or together?" I have already expressed my opinion in the matter—they join and apex together.

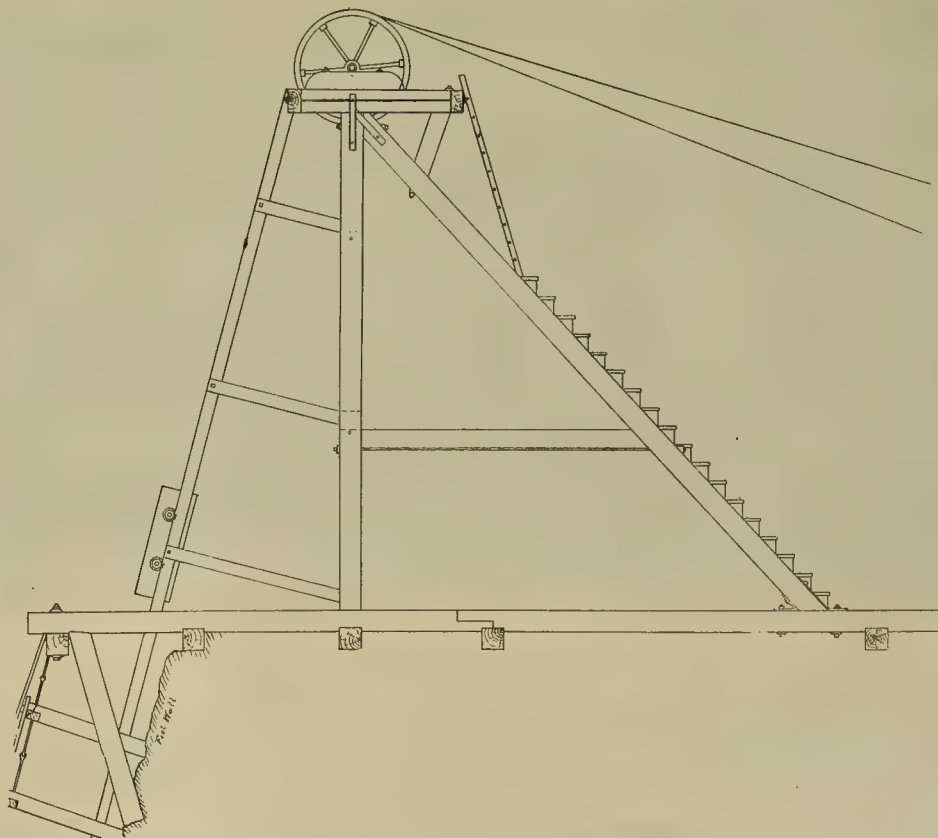
METALLURGICAL PROCESSES which involve the use of calcium carbide as the reducing agent, possess an especial interest due to the fact that they are, in an indirect manner, electro-chemical, for the energy used for the reduction is as truly electrical as though the effect was produced directly by electrolysis, instead of indirectly through the medium of the carbide furnace. Hence a discussion of such processes always involves the question of relative efficiencies as between fused bath electrolysis and electric furnace reduction—a question which generally solves in favor of the furnace. This question is raised but not answered by a patent recently issued to Henry Spencer Blackmore, of Mount Vernon, N. Y., for the reduction of aluminum compounds by the reaction therewith of a carbide. Mr. Blackmore finds that aluminum oxide is reducible by aluminum carbide with the liberation of the metal of both reacting bodies and in accordance with the equation $Al_2O_3 + Al_4C_3 = 5Al + 3CO$, the reaction being simply analogous to that employed by M. Moissan some years ago for the preparation of metallic chromium. If, however, the oxide and carbide of aluminum be employed in the solid state, it is found that the aluminum is either volatilized or so distributed through the residual charge as to render its collection impracticable, and, accordingly, it is proposed to suspend or dissolve the oxide and carbide in a molten bath, which remains inert with respect thereto, and which so reduces the temperature of the reaction and so alters the character of the medium as to permit the liquid metal to be tapped off. Two procedures are described: In the first, a mixture of cryolite and lithium fluoride is fused, and the oxide and carbide of aluminum are alternately added, the reaction occurring readily, it is said, and the aluminum separating freely. In the second, oxide of aluminum is added to the bath and calcium carbide then introduced, the effect being to produce aluminum carbide within the bath by reaction between the cryolite and the carbide of calcium, the aluminum carbide then reacting with the oxide present to yield the metal. The calcium fluoride formed interferes to no marked degree with the operation, and in the early stages serves to promote the fluidity of the metal. Eventually, however, the bath must be regenerated or renewed. Mr. Blackmore is authority for the statement that he has succeeded in producing aluminum by reduction by calcium carbide, on an experimental scale, and at an expense not exceeding 7 cents per pound.—Electrical World.

Gallows-Frame, Pinos Altos Co., Chihuahua, Mexico.

On this page are shown side and end elevation plans of the head or gallows-frame of the mine



End Elevation Gallows-Frame, Pinos Altos Mine, Chihuahua, Mex.



Side Elevation Gallows-Frame, Pinos Altos Mine, Chihuahua, Mex.

of the Pinos Altos Co., Ltd., at Chihuahua, Mexico. The depth of the two-compartment shaft is over 1000 feet. The frame, though of timber, using very few sticks, is so constructed that in use it has proven to be exceedingly stiff and free from vibration.

By a FRENCH PROCESS wood that has been impregnated with magnesium sulphate is said to become fireproof. Lead electrodes separated from each other by a sailcloth diaphragm are used in the process, which is electrolytic. A direct current of 110 volts is passed through the wood, extracting the sap and replacing it by non-inflammable salt. The rate of energy is about half an electric horse power at twenty to thirty volts per cubic meter. The treatment of the wood lasts about forty-eight hours. It is claimed paving blocks have been successfully manufactured by the process.

The Sulphide Ore Problem.

NUMBER III.—CONCLUDED.

Written for the MINING AND SCIENTIFIC PRESS by JAS. W. WORSEY.

Having briefly reviewed the sulphide ore problem, so called, I here present a description of a method which I have originated—one which any chemical experimentalist can verify for himself. Possibly he may not make a big success at first; but practice, which is so needful in chemical and metallurgical work, will soon convince him of the feasibility and value of the process. The several steps of the process are as follows:

(a) Calcination of the crude ore until sufficiently porous and the sulphur contents are reduced to about 5%.

(b) Finely powdering the calcined ore.

(c) Mixing with about 2% commercial nitrate of soda.

(d) Boiling with a given quantity of dilute sulphuric acid of about 1.450 specific gravity until the bulk of the lead and zinc are converted into sulphates, with utilization of the escaping gases for the manufacture of sulphuric acid.

(e) Roasting the plastic mass in a closed furnace, with addition of an oxidant, if necessary, until all iron present is in the ferric state.

(f) Dissolving out the zinc and copper sulphates and other soluble salts present in a weak sodium sulphate solution, leaving the iron, lead, silver, gold, etc., and other substances undissolved.

(g) After removal of copper, if present, precipitating the zinc by H_2S , or by lime and volatilization as oxide, the residue being utilized for fluxing the non-volatile residues.

(h) The residues of the dissolving vessel to be smelted in the well known manner for the recovery of the lead, silver and gold.

This is a fair outline of the course of procedure, and any reader so desirous may make an experiment in the following way:

Take of the calcined zinciferous ore finely pulverized, say, half a pound, put same into a leaden or other acid-resisting basin, shaped like an evaporating basin, and heat on a sand bath; mix through the ore the quantity, 2%, sodium nitrate, and add about four

ounces strong sulphuric acid, to which water has been previously added to reduce same to 1.450 specific gravity, carefully stirring the ore from time to time, and finally boil. When the ore becomes pasty remove same and transfer to an iron ladle, or other like vessel, and roast carefully—the heat hardly to reach dull redness—until all vapors have disappeared. If iron is present in a notable proportion, then let it be converted to the ferric state by an admixture of quicklime and niter, in the proportion of 90% of the former to 10% of the latter, varying the amount according to the quantity of iron present, and let the whole be well stirred until the reaction is completed, when it may be withdrawn from the fire and allowed to cool. The treated ore may be boiled in water containing a little sulphate of soda; but, if the quicklime and niter have been added during the muffle roasting, then there will be sufficient of this salt in the ore to

answer the purpose. The boiling need not occupy more than twenty minutes, when it will be found that the bulk of the sulphates will be dissolved out of the ore and the solution filtered; the copper, if present, may be dissolved by zinc, the clear liquor taken to another vat and the zinc precipitated either by H_2S gas, as a sulphide, the cream of lime in the usual way and the dried precipitate treated in a special furnace to sublime the zinc as oxide. Sometimes a second boil may be requisite, treating the resulting solution as before. The ore, after drying in the ordinary way, may be smelted for the lead, silver and gold in the common method for silver-lead ore. The amount of extraction will vary with the skill of the experimentalist. With the writer it ran: Zinc, 60%; lead, 80%; silver and gold, 96%.

In practice a furnace, after the construction of those used in the manufacture of sulphate of soda, may be used, and for the dissolving of the solubles therefrom an agitating apparatus as designed by me is the proper device for this purpose. It is supplied with high pressure steam and cold air when required, has tilting gear and is capable of treating one or two tons per hour, according to size, replacing the old-fashioned leaching plant used for this purpose.

The Locomobile.

The locomobile is a self-propelling carriage which is, as its name would suggest, its own locomotive. It is operated by steam generated in a boiler used in an engine. The boiler, engine, fuel, gasoline and water tanks are all compactly secured to the bottom of the vehicle and to the running gear. The complete result is the exceedingly handsome and useful types of road wagon called by the makers the "locomobile," half-tone views of which are shown here and on the first page of this journal.

The special characteristics of the locomobile are lightness of structure, and speed, economy and simplicity of operation. The water in the boiler is converted into steam by heat from burning gasoline vapor. The gasoline is carried in a copper tank and forced by compressed air through the boiler, where it is vaporized to the burner underneath where it is

Auriferous Beach Sands, Wreck Bay, British Columbia.

The only point at which black sand has been profitably worked in British Columbia so far is at Wreck bay, which is situated a few miles north of Amphitrite point on the west coast of Vancouver island, and in the West Coast Vancouver Island mining division. The discovery and exploitation of this deposit has undoubtedly been assisted by the fact that it occurs on the tongue of land separating Ucluelet arm from the open sea and is, comparatively speaking, easily accessible from the shoreward side.

Wreck bay extends 3 miles along the coast and about 1 mile inland. The beach is exposed at low tide and consists of a garnetiferous black sand mixed with ordinary sand and gravel. During the season of 1900, \$12,584 were expended, chiefly in the construction of a flume 9800 feet long, and in the building of a dam across Lost Shoe creek. The gold extracted during the same season when work was carried on in a limited way, and under difficulties of some magnitude, amounted to \$10,639. For 1901 operations have just begun and give promise of most satisfactory results. The occurrence of the gold is of the type which may be described as the result of glacial deposition in the bank confronting the beach and subsequent erosion and concentration by the action of wind and tide.

In addition to the Wreck bay deposit there exists east of the mouth of the Jordan river and about 46 miles west of Victoria, what appears to be an old river bed. The river was probably a glacial stream, and the material which it carried derived from the graphitic slates which extend in a somewhat narrow belt from the Jordan river in a southeasterly direction to Esquimalt harbor, outcropping at Goldstream and Langford lake. These slates are probably of Triassic age and analogous to the rocks found at Boston bar in the Fraser river and in the Cariboo, Columbia, Omineca, Purcell and Selkirk mountains. Stringers of quartz which frequently carry gold occur in the slates. The placer deposits of the Jordan river are therefore most likely an

bay, B. C., is a modified sluice fitted with amalgamated plates. This machine is 30 inches wide and has a large and a small compartment, with a means of deflecting more or less water into either. The larger compartment carries the gravel over the grizzly and does the washing, while the water in the small compartment acts as a carrier for the coarser tailings which fail to pass through the 6-mesh screen with which the apparatus is furnished. After passing through the grizzly and screen, the gravel travels over four amalgamated plates, each 30x16 inches, and then over a series of riffles and traps, the principal object of which is to prevent any loss of mercury.

In actual practice, on a cleanup of say \$300, \$250 has been found on the first plate, \$40 on the second plate, \$10 on the third, and nothing on the fourth. The gold, though fine, is particularly clean and free from that "rusty" character which has proved such an obstacle in other workings of a similar nature.

The tailings are delivered below high-water mark, and as the ground is worked out the machines can be easily moved along and the flume tapped at a fresh place. For labor, each machine requires about five and one-half men, as follows:

One man stripping off non-paying dirt; one man throwing up gravel to platform of machine; one man feeding machine; one man looking after machine and tailings; the part time of one man prospecting ground.

The capacity of each 30-inch machine is a little over twenty-five tons per day of nine hours. There are now six machines on the ground, but practically only one was in working order before the bad weather set in, necessitating a partial suspension of the work.

From the Ucluelet Co.'s claim 600 yards of gravel have been put through the machine, giving a yield of \$9400, or a little over \$15.50 per yard. This represents the yield of about one-tenth of a claim. An average section of the ground would appear to be as follows:

1. Two feet of non-pay, which has to be stripped.
2. Three feet of pay dirt, the lower 8 to 18 inches of which is fairly rich.
3. A fine barren sand, or sometimes clay, underlying the pay dirt.

During this season the machine was modified, in the following particulars: The swift stream first carries the material over 5 feet of riffles and then over angle iron so placed that the apex is upwards and arranged longitudinally within a sixteenth of an inch between each, in the direction of the current. The coarser gravel passes over the grating on the dump, while the finer material drops through the grating with such sufficient water to wash it over the plates, into a box perforated at the farther end and thence onto the amalgamated copper plates. In order to prevent loss of amalgam the current is led from the plates to cross-riffles, from the riffles to a box with baffles and thence to the dump.

The fineness of Wreck bay gold varies from \$18 to \$20 per ounce after melting. During 1900, 700 ounces were recovered. During the present season the value of the gold produced was, to July 1st, a little over \$5000. While this amount is insignificant, the returns later are expected to be much more considerable when the number of machines employed for saving the gold are increased.—B. C. Mining Record.

Converter or Bessemer Process of Copper Reduction.*

By C. C. LONGRIDGE.

This process is used for obtaining coarse copper from mattes produced by the German, English, or Anglo-German methods. The principle is to force air through the molten matte, thereby converting sulphides of copper and iron into cuprous and ferrous oxides, with the evolution of sulphur dioxide. The cuprous oxide decomposes any undecomposed sulphide of copper, producing metallic copper and sulphur dioxide, while the ferrous oxide is slagged off by the silica of the converter lining. If the blast is continued long enough, coarse copper and slag are obtained; if it is stopped earlier, a richer matte and slag result.

Raw ore or very low-grade mattes are not suitable for this process, partly because more slag would be formed than could be conveniently handled, or kept fluid by the heat developed by the oxidation of the sulphides; partly because the excess of iron in such mattes would too strongly attack the converter lining; and partly because no practical system of continuously feeding in the matte has been found. The mattes, therefore, to be suitable, should contain at least 25%, and preferably 45% to 50% of copper. Mattes containing more than 60% of copper do not furnish enough heat by oxidation to complete the process. The heat units freed by oxidation are: for sulphur, about 2200; and for iron, about 1576. To these should be added the heat from the combination of iron and silica, while a considerable reduction must be made for the dissociation of the sulphides.

In bessemerizing poor matte, the charge is blown up to 60% or 70% of copper. The slag is then removed, fresh matte added, and the whole blown to

*Trans. Inst. of Mining Engineers, Newcastle-upon-Tyne, December Meeting.



Locomobile Surrey at Sacramento, Cal.

ignited. The operation is very simple. The operator sits on the right hand side of the carriage, with his left hand on the steering gear. With the right hand the throttle lever is pushed forward slowly. This admits steam to the cylinder and the carriage starts. Speed is increased by pushing the lever forward. The carriage is reversed by bringing the throttle lever to its original position and the reversing lever then thrown back; the steam admitted to the cylinders by the throttle lever reverses the motion of the carriage. To stop the carriage, shut off steam and apply brake. On average roads a tank of gasoline will operate 40 miles, and 20 to 25 miles are made with one tank of water. As high as 40 miles an hour rate of speed can be had.

The illustrations are of locomobiles in use for pleasure riding. Their appearance in parks, streets and country roads is ceasing to be a novelty, with the rapidly increasing number coming into use. Experience with them is proving that they cost to keep less than a horse, are safer and more comfortable.

The carriages are manufactured by the Locomobile Co. of America, with office at 11 Broadway, New York. The Locomobile Co. of the Pacific, the Pacific coast representatives of the manufacturers, has its office and warerooms at No. 1622 Market street, San Francisco, Cal.

accumulation from large denuded areas of these rocks.

The formation from the Jordan river eastward towards Sooke consists of clay, sandstone and conglomerate of Tertiary age. For a considerable distance from the mouth of the Jordan, the shore is 25 feet to 100 feet high and composed of blue clay. The beach between the clay and the water line is composed of black sand; while along the top of the clay cliffs there is gravel heavily stained with oxide of iron for a thickness of 3 to 10 feet. The gold in this gravel is not visible to the naked eye, but by panning the black sand becomes concentrated and from it the gold can be easily removed. Near the mouth of the Jordan, the sand is 2 to 3 feet in thickness and pans from top to bottom, though best values are found at the bottom near the blue clay bed. A probable average would be 50 cents per ton of sand. The deposits could be easily worked, so operations might be carried on at very little expense. There are also doubtless many unknown, or at least unprospected, deposits of black sand on the west coast of Vancouver island, and on the northern part of the west coast of British Columbia deposited by glaciers which have long since disappeared or have shrunk to the tops of the mountains.

The apparatus used for saving the gold at Wreck

99% of copper. The work of the converter is known to be complete when the evolution of sulphur dioxide ceases, and little particles of copper appear in the flame. In the process, arsenic and antimony are completely volatilized; zinc is partly so, and partly slagged off; lead, tin and cobalt pass into the slag; and nickel and bismuth remain in the copper. Converter slag is sufficiently rich to need retreatment, and on account of its iron is a useful flux for melting siliceous ores.

The loss in bessemerizing, with provision for ample dust chamber capacity, and too many volatile metals in the matte, is from 1% to 1.5% of the copper. The loss in silver lies between 2% and 2.5%. This latter loss increases greatly with the presence of volatile metals. Thus in bessemerizing concentrated matte from lead-silver furnaces, carrying 40% of copper and 15% of lead, the loss in silver has reached about 50%. The loss also stands in close relation to the blast pressure.

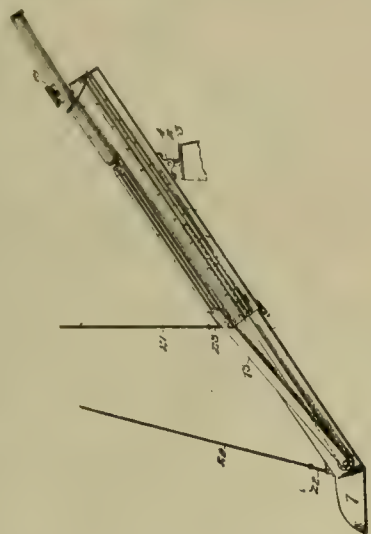
The heaviest expenses in bessemerizing are power for the blast, and refractory materials for the converter linings. Hence with ample water power, and the necessary quartz and clay, it may, where fuel is costly, be cheaper to produce a low-grade matte and throw more work on the converter. On the other hand, with cheaper fuel, and no water power, it is generally better, especially with fine ores and concentrates, to do most of the desulphurization in the calciners and furnace.

Mining and Metallurgical Patents.

Patents Issued August 6, 1901.

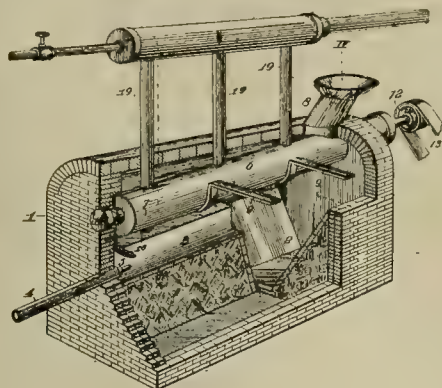
Specially Prepared for the MINING AND SCIENTIFIC PRESS.

DREDGING APPARATUS.—No. 679,738; J. G. Garwood, Butte, Mont.



A support, a relatively fixed conductor section mounted to swing in vertical and horizontal planes upon support, a sliding section adapted to telescope, conductor sections serving as conveyors for discharge of load by gravity therethrough when dredge is raised, a shovel carried by sliding section, guide and brace bars slidably connected to fixed conductor section and also connected to sliding conductor section to guide and brace and limit outward movement of latter, means for raising and lowering dredge, a cylinder mounted upon fixed section, a piston in cylinder, a crosshead sliding in guides on fixed conductor section and connected to piston rod, and connecting rods between crossheads and sliding conductor section.

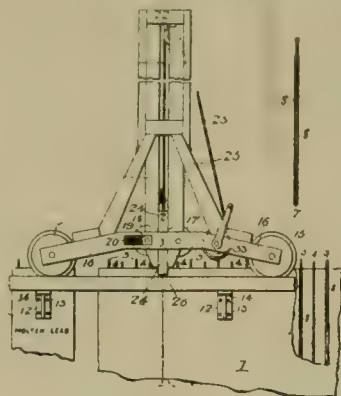
APPARATUS FOR DESULPHURIZING ORES.—No. 680,171; E. M. Oviatt and A. Dean, Denver, Colo.



A furnace, having a settling chamber, means for heating interior of furnace, a retort cylinder mounted within furnace, and discharging in front of means for heating interior of furnace, a conveyor arranged to operate within retort cylinder, a manifold located

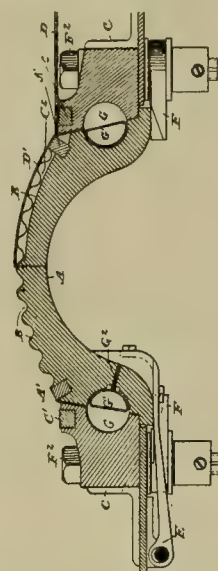
directly over retort cylinder, having communication with retort cylinder, and means whereby gases liberated in retort cylinder are drawn into and delivered from manifold, means for heating interior of furnace being adapted to complete roasting of ore and drive it into settling chamber.

ART OR PROCESS OF REFINING LEAD BY ELECTROLYSIS.—No. 679,824; A. G. Betts, Lansingburg, N. Y.



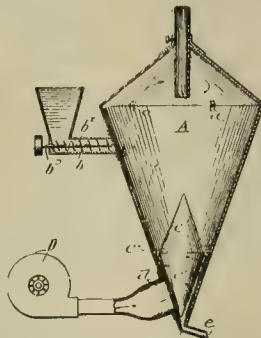
Subjecting lead alloy as anode to electric current in a solution of a lead salt of a fluorine acid, and electrodepositing lead on cathode.

DISCHARGE DOOR FOR CYANIDE TANKS.—No. 680,154; D. Jansen, Johannesburg, South African Republic.



A door provided on its upper side with a series of channels and cross-channels B, over which is placed a piece of filtering medium D', a wooden rim A', to which filtering medium is fastened, seating C into which door A fits, C being provided with a wooden rim C', to which filtering medium at bottom of tank is secured and cross-channels C' to drain solution into bottom of tank, hinge E, fastening devices F F, air tube G' interposed between door A and seating C contained within recess G and means for inflating same.

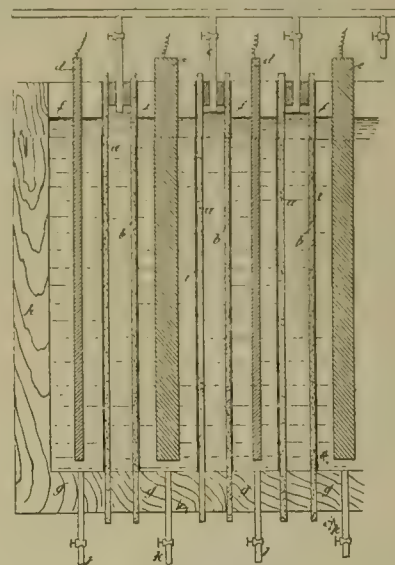
ORE CONCENTRATOR.—No. 679,869; A. H. Stebbins, Little Rock, Ark.



A separating chamber of gradually increasing cross-sectional area from its bottom to its top, a feeding device for feeding material into upper part of separating chamber, an air or fluid inlet below feeding device, means for producing a blast of air or fluid through same, an augmenting and distributing device adjacent to inlet for producing a maximum strength of current and distributing same around separating chamber, and suitable outlets for concentrates and waste products, lower portion of augmenting and distributing device against which blast is directed conforming in shape to adjacent walls of separating

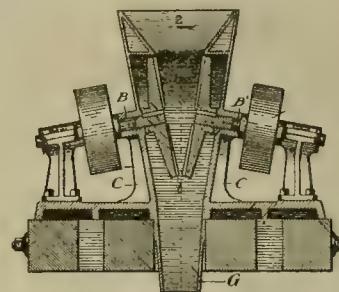
chamber to contract the blast between the two and thereby give maximum strength to air currents throughout space between device and separating chamber.

PROCESS OF MANUFACTURING COPPER SULPHATES.—No. 679,985; H. Palas and F. Cotta, Marseilles, France.



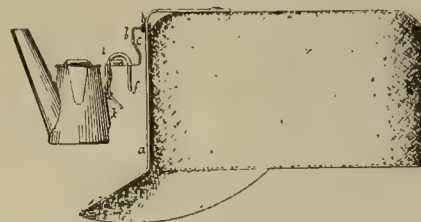
Separating the anode and cathode by a porous diaphragm, supplying a stream of electrolyte solution of an alkali-metal sulphate to a soluble anode of metal to be transformed into sulphate, supplying another stream of same electrolyte solution to cathode other side of diaphragm and passing a current electricity therethrough.

PROCESS OF TREATING METAL-BEARING ROCK.—No. 679,901; T. J. Lovett, Chicago, Ill.



Subjecting a mass of broken ore or rock to simultaneous triturating and torsional impacts, whereby each particle of rock grinds up its neighbor, producing trituration of non-metallic element and forming copper into lumps of slug, pellet or similar shape.

MINERS' LAMP SUPPORT.—No. 680,133; S. Davis, New York, N. Y.



A base piece and arm made to swivel or pivot on base and extended downward from pivot to support a lamp with its center of gravity below pivot.

WELDING.—No. 680,182; B. B. Thomas, Rossville, Tenn.

The method consisting in cleansing the metal, raising same to a red heat, subjecting heated portions to a welding powder, which has properties of promoting fusion, causing softening during heating of metals, and also hardening during cooling, and consisting of carbonate of iron, steel dust or cast-iron filings, pulverized glass, pulverized borax, prussiate of potash, muriate of ammonia and pulverized rosin, then reheating treated metals to a white heat, and finally submitting metals to a continuous pressure.

ELECTROLYTIC PROCESS OF OBTAINING METALS FROM THEIR FUSED COMPOUNDS.—No. 679,997; G. P. Scholl, Philadelphia, Pa.

Fusing a bath containing a mixture of sulphide of the desired metal with another compound of metal which is convertible into sulphide by nascent sulphur; and subjecting fused bath to electrolysis by action of suitable electrodes.

MINING SUMMARY.

Specially compiled and reported for the
MINING AND SCIENTIFIC PRESS.

ALASKA.

JUNEAU.

The test made at the Alaska-Juneau mine in Silver Bow basin, near Juneau, to determine the milling value of the ore, is believed to have proven satisfactory, as a 6000-foot tunnel is projected from Snow Slide gulch to tap the lower workings of the property. This tunnel will have a double track. R. Mein, secretary of the company, says that the survey has been made. With the tunnel built, a large stamp mill will be put on the property.

KETCHIKAN.

Moran, Charles & Smallwood are putting up a 2-stamp prospecting mill at Smuggler's Cove, Ketchikan P. O., and developing a free-gold lead. They expect to be able to make the output pay expenses, and will add more stamps as ore is developed.—The Keystone mine is being opened by Supt. J. A. Bradley.

McMillin & Schultz are doing development work on a Chomondelay Sound, Prince of Wales Island, mine, under the direction of A. E. Knapp, M. E. The developments thus far are about 150 feet of drifting on a small ledge, showing ore averaging about \$25 per ton.

NOME.

S. Miller of the Tishou district says that a contact of trachite and soft schist crosses Hume creek at No. 6. This contact is heavily charged with arsenical iron, and in places shows large bunches of pulverized, amber-colored quartz, which carry fine gold in small quantities. Mr. Miller says this formation can be easily traced for a distance of 8 miles, extending from Nolan creek, on the Tishou, to No. 9 on the Bluestone river, which empties into Grantley harbor, cropping out very distinctly on both sides of the Tishou river canyon. It is probably the lode source of the placer gold which is found in streams below the belt but not above it.

ARIZONA.

GILA COUNTY.

W. H. Dawson, president, and E. L. De Lestry, secretary of the Fraternity Mines Co. of St. Paul, Minn., have bought the Rattlesnake and Rattlesnake Extension claims, near Pinto creek, Globe P. O., and have arranged to do considerable development work on these properties at once.

The Bobtail Mines Co.'s property on Mineral creek, 18 miles from Globe, is being developed by F. D. Adams, Supt. There is said to be 5 feet of ore in the drifts at the 100-foot level, which assays \$45.45 per ton in gold, silver and copper. A whim has been put up at shaft No. 1, 718 feet of track laid to the dump above the mill site, and 200 tons of ore moved to the new dump. With a hoist and pump on shaft No. 1, it is said a 50-ton concentrating plant, or even one of greater capacity, could be supplied with ore.

A discovery of ore on one of the claims, near Globe, owned by W. House, C. Sherwood and J. Mathews, has been made. It is a ledge some 50 feet wide, which prospects well in copper. On another part of the property there is a conglomerate which tests have shown to carry a considerable per cent of copper. It is ore that it is believed can be successfully treated by leaching.

MARICOPA COUNTY.

J. Wetherlay, manager of the Socorro G. M. Co., reports work at the mine, preparing the camp. He is now putting in a well about 2 miles below Harrisburg. The pump and pipe line are to be installed immediately to provide water while the machinery is being installed at the mine.

The Oro Grande M. Co. at Wickenburg is working eighteen miners and the main shaft is down 280 feet. The last 20 feet in the shaft has gone through a rich ore body.

PIMA COUNTY.

C. Bauer, at a depth of 10 feet, has uncovered a 2½-foot ledge of rich gold rock in the Ella claim, in Canada del Oro.

PINAL COUNTY.

The Monte Cristo M. Co. is operating 24 miles south of Casa Grande. There is a 10-stamp mill on the property, but D. McFarland, the manager, states that the company will enlarge the mill and add a cyanide plant to it.

SANTA CRUZ COUNTY.

The Last Chance mine and mill in the Mogollons, at Patagonia, has closed down.

YAVAPAI COUNTY.

The Dividend M. Co. at Chaparral are doing extensive development on a large body of free milling ore. F. E. Biles is Supt. and is working fifteen men.

At the Cash mine, at Maxton, the shaft

is down about 330 feet on the main ledge and the ore taken out is a copper sulphide carrying gold and silver. The company is building a 10-stamp mill.

YUMA COUNTY.

While sinking on the San Francisco mine, Cedar Valley, a body of ore was encountered containing specimen rock. The mine has a large body of ore opened up. The mill now at the mine is not adapted to the ore and a new plant will probably be installed. C. D. Pickering is manager.

CALIFORNIA.

AMADOR COUNTY.

In drifting at the 1800-foot level of the Central-Eureka, at Jackson, a rich ore deposit was encountered. This pocket is reported to be richer than any heretofore found. Over half a ton of extraordinary rich rock was taken out in two or three days.

L. A. Gross of Drytown is making arrangements to go East to organize the Centennial M. Co. and resume operations on the mine, which have been suspended some time.

BUTTE COUNTY.

The Haesloop or Cornelius mine, in Morris ravine, sometimes known as the Yuba placer mine, near Oroville, has been sold through W. P. Lynch of Cherokee. The mine is a steady producer. It is a drift gravel mine, near the Hendricks hydraulic mine. The new owners will put in some machinery and work it more extensively.

R. G. Ford of Minneapolis, Minn., president of the Miller M. Co., owning a mine on the ridge above Forbestown, says that his company is working fifteen men on a drain tunnel, which, when completed, he calculated would drain the workings for perhaps ten years in advance. After the tunnel is finished, the company would then likely erect a 20-stamp mill. R. S. Haskell is Supt., also an Eastern man.

CALAVERAS COUNTY.

The Tulloch mine hoist, mill and powder house, situated near Angels Camp, have been destroyed by fire. About 5000 pounds of powder was exploded, but no one was injured. The loss is estimated at \$8000.

An air compressor has been contracted for by the Oriole Co., at Angels, to operate air drills.

At the Lone Star mine, at West Point, nine men are employed. The shaft is at present 300 feet deep, and stoping will be commenced in levels 1 and 2. J. E. King is Supt.

M. D. L. Wickham is at present engaged in putting five tons of ore through his arrastra on Bear creek at West Point. This ore was taken from his mine, the Little Ohio, and will, it is estimated, yield on an average \$40 to the ton.

The Emery G. M. Co., at El Dorado, has had a survey made on the South Fork of the Mokelumne river for a flume, which will be 7 miles long. A sawmill will be built by the company on the C. W. Werle place to cut lumber for the flume, about 1,000,000 feet being required.

MONO COUNTY.

A cloudburst in the mountains above the Sweetwater Con. mine, near Bridgeport, did considerable damage to the milling plant which was under construction, carrying away lumber and some of the machinery. The greatest loss to the company is the delay in the erection of its mill, which it was intended to have run before winter, but which is now not possible before next spring.

NEVADA COUNTY.

The Gray Eagle M. Co. has been incorporated to mine at Maybirt. The directors are C. Richards, J. B. Ott, W. Tierman, F. Percival and H. Dienier. Of the capital stock of \$50,000 the company says that \$30,000 has already been subscribed.

The Orleans mine has resumed operations after a shutdown of several months. The mine has been lying idle awaiting a large electric motor which had been ordered from the East. It is now in operation and working to perfection.

W. H. Bray of San Francisco has taken a bond on the Posey mine, at Nevada City, and intends to do considerable development work on the property. The ledge is small, but rich.

The Golden West mine, near Grass Valley, owned by C. Temby, J. Seymour and C. D. Trenggning, is to be developed. There is a 5-foot ledge of free-milling ore in the property.

PLACER COUNTY.

The new Huntington mill at the Annie Laurie quartz mine, near Colfax, has been started up.

The Pioneer quartz mine, near Towle, will resume work before long. An assessment of 50 cents per share has been made, which is expected to provide \$50,000 to do development work with.

PLUMAS COUNTY.

P. Mulloy has bonded the Needed

Wealth quartz property, situated on Buck's creek, near Quincy, and also a portion of an adjoining location known as the Shamrock to F. D. Frazier for eighteen months; price \$20,000.

SHASTA COUNTY.

The old Texas & Georgia gold mine, at Whitehouse, Old Diggings district, is reported to be sold. The mine has lately been worked under a lease by H. C. Woodrow and C. C. Bush of Redding. The buyer is the Texas G. M. & Power Co. W. H. Garlick is president; E. W. Runyon of Red Bluff, H. Eikoff and A. B. Paul of San Francisco and H. C. Woodrow of Redding are the Board of Directors.

E. Harvey of San Francisco has bonded the Keystone No. 1, Keystone No. 2, Wishbone, Homestead, Lucky Ned and Mountain Bell quartz claims at Whitehouse, Old Diggings district. The option runs to June 10, 1904, and the owners agree to allow the bondholder 50% of the net value determined by smelter returns, the other half to be applied on account of the purchase price.

The Niagara mine, near French Gulch, now owned by Holland people represented by J. DeFremercy of New York, has been bonded to W. T. St. Auburn, a former manager of the mine. At present the mine is being worked in a small way by tributaries. For further development it will be necessary to sink below the old workings at an estimated cost of from \$20,000 to \$25,000, as both hoisting and pumping plants would have to be installed. A new lower tunnel to crosscut the vein 400 feet below the present works would have to be nearly a mile in length. There is a complete 18-stamp mill on the property.

The records at Redding show the recording of an average of 250 quartz and placer locations per month for the past year. The locations are about equally divided between quartz and placer.

SIERRA COUNTY.

J. R. Cox, A. Hunter and J. C. Taylor have bought the Barney Gallagher mine, on the North Fork, near Downville. The new owners will operate the property as a drift mine.

A. R. Pride and R. Babb, who are operating on Deer creek, near Downville, have applied to the California Debris Commission for a permit to mine by the hydraulic process.

SISKIYOU COUNTY.

It is reported that the claims on the Salmon River Con. M. Co. have been bonded for a sum understood to be nearly \$1,000,000. F. M. Archer of Redding has the option. The property is at the head of the South Fork of the Salmon river and covers 210 acres, including Deep Bank and Thompson Bar claims. The paystreak is said to be deep, between 200 and 300 feet. There are now three giants, with 4980 feet of flume and 940 feet of ditch, in operation. The claims are being worked with W. A. Cooper as Supt.

The Boston, Mass., stockholders of the Black Bear quartz mine, at Black Bear, have directed Supt. J. Daggett to start the mill. A large body of fine ore has been struck recently, which will keep the mill in operation. Mr. Espey of Seattle, Wash., is said to have met with excellent success in his claim at the mouth of Hungry creek, near Coles, which pays well at present.

The Sterling, Blue Jay and other quartz mines in the Hungry Creek district are lying idle on account of litigation; the Central, owned by C. R. Wiegand of Seattle, Wash., is not worked at present.

J. O. Rusby is now working a quartz ledge on Deadwood, near Yreka, which he has bonded from T. Macaulay. He is finding good prospects, and intends putting up a mill in a short time.

TRINITY COUNTY.

Eighty-six men are at work on the Sweepstake, at Weaverville, thirty-seven of them opening up the mine for the winter's run. J. H. Kelly is superintendent of this work under F. Hall, manager. A second lot of men are at work under R. Howard constructing a reservoir at the mine to feed the hydraulics. Another force of men are employed in erecting the sawmill on Dutton's creek.

The Valencia Co. copper property at New River, Sherwood P. O., known as the Bingo, is a new proposition. The ledge is claimed to be 20 feet wide.

YUBA COUNTY.

The Oroville Gold Dredging & Exploration Co., in which J. E. Doolittle and W. F. Bradley of San Francisco are interested, has bought 2000 acres of placer claims, which it is asserted will require seventy-five years of continuous exploitation by dredging to exhaust. The price to be paid for the property is said to be between \$200,000 and \$300,000.

Condemnation suits to obtain title and possession of land wanted for hydraulic debris barriers on the Yuba river are to

be brought. The land required is 16,000 acres, and title has already been bought for part of it. Some owners are holding out for condemnation proceedings in the United States Circuit Court in the expectation of being paid more. The suits are to be brought under instructions of the War Department, whose engineers have charge of construction of the dams.

COLORADO.

BOULDER COUNTY.

A strike of tungsten has been made near Freshwater. The ore, it is claimed, will average 50% tungsten across the 2-foot vein. The owners are J. M. White and associates of Freshwater. The last sale of wolfram ore, in which a quotation was made, was at Boulder a short time ago, and the price paid is said to have been \$150 a ton for ore carrying 50% tungstic acid.

Race, Bruner & Korf of Eldora have sold the Beatrice group of five claims on Guinn mountain to Cripple Creek parties for \$5000. Shortly after the deed was closed, Eastern parties, who had been examining the property, are said to have offered \$20,000—\$5000 down.

The Tamborine G. M. Co. of Colorado Springs, of which G. P. Tiffany is president, has installed a new 50 H. P. hoist and boiler and is erecting a new shaft-house. The company has just paid a \$7000 dividend.

CLEAR CREEK COUNTY.

(Special Correspondence).—Work on the Oro Verde, at Yankee, has made some progress this season. Crosscuts to the extent of 500 feet have opened two veins, on which considerable drifting has been done. An upraise is now being made in ore. Recent sample tests show the ore to run about \$16 per ton. J. L. Goodier is manager.

Yankee, Aug. 10.

(Special Correspondence).—The Gold Fissure G. M. Co., G. A. Bristol, manager, have sunk their shaft to a depth of 275 feet, on their group near Empire. At the 175 level a crosscut runs 100 feet to the ore body, there being 150 feet of drifting on the latter. The ore is an iron and copper sulphide. According to shipments made the smelting ore runs from \$35 to \$100 per ton and the mill ore about \$12 per ton. A run of 150 tons was made at a concentrating mill in the neighborhood.

The Empire Tunnel & G. M. Co. has been organized to drive a tunnel into Coyote mountain, near Empire, interested in which are Messrs. Dewey, Maxwell, Johnson and others. The work has proceeded over 500 feet; and it is expected in time to run 2 miles and cut 1500 to 2000 feet below the apex in the mountain. A 2400-foot flume is to be built to convey water for power purposes.

Empire, Aug. 12.

The Fall River M. & M. Co. has been incorporated by C. M. Berry, R. S. Barker, T. W. Hoyt, G. D. Preston and J. I. Pritchard; capital, \$250,000. The proposition is to operate on Fall river near Georgetown, where the company owns properties.

The Seaton Mountain G. M. Co. has been incorporated by F. Carruthers, F. A. Joslin and W. M. Desch; capital, \$100,000.

O'Neill, Barth & Co., of Empire, have bought the Heddensburg lode, and are having machinery placed for operation by electric power. The mine shows a streak of ore in the bottom of the shaft which averages about \$175 per ton.

The steam shovel to be used by the Newhouse people in the tunnel at Idaho Springs has been tested and it is reported that in the experiments made it was successfully demonstrated that the shovel could be operated on the rock with or without hoist plates.

The Red Oak concentrator at Georgetown has been started up again. In the mine it is reported that there is ore 5 feet wide developed for 600 feet in length that is said to average \$20 per ton in value as mined.

The Gold Bug mine on Covode mountain, at Empire, is showing ore in the upper and lower adits, in the middle working. A new adit, recently started, is in 200 feet and is exhibiting a marked increase in the value of the ore. The average percentage of copper in the Covode mountain ores is found in the Gold Bug, and will add to the value. W. P. Clough of New York has bought a considerable interest in the mine and will superintend it.

FREMONT COUNTY.

(Special Correspondence).—A concentrating plant of considerable capacity is being erected at Cyanide, near Florence, to work over the mill tailings of the Metallic Extraction Co. C. A. Hoyt, for several years assayer at the latter plant, is to become manager of the concentrating plant.

Florence, Aug. 10.

The New Jersey Zinc Co. is building a big concentrating mill at Canon City, to treat the zinc product of Lake county.

The Zinc Company, which owns the Colonel Sellers mine, is now taking crude zinc ore for its works at Mineral Point, Wis. The Moyer and A. Y. and Minnie are shipping what zinc ore they can save that will run from 48% to 50%. Although zinc is now selling in New York at almost the lowest price in its history, \$3.90 per 100, a 4% zinc ore will pay a small profit to the miner. The principal item of expense is the freight from Leadville to Wisconsin.

GILPIN COUNTY.

The new Sleepy Hollow G. M. Co. has incorporated, capital \$300,000, with J. F. Hoskins, F. L. Sigel and S. A. Howes as directors. It intends to operate the Sleepy Hollow mine, near Black Hawk, which has been worked only on a small scale. The shaft has been sunk nearly 900 feet and the property has been outputting a smelting product above the average grade. J. F. Hoskins is manager.

M. Wilkinson and associates are drifting in their lease on the dump lode on Bobtail hill, at Black Hawk, and are taking out milling and smelting ores, both of a low grade.

Sinking has been resumed in the O'Neill mine, in Gregory district, near Black Hawk, under contract. The shaft is now about 575 feet deep, and the company intends to put it down to a depth of 1000 feet. H. C. Eastman is manager.

Work has been resumed on the Alps property at Quartz hill, Central City, by the lessees, and the extending of the west 1320-foot level is being done with the expectation of cutting the ore shoot almost any day. J. Williams is Supt. of the property.

Manager B. Campbell of the Cashier G. M. & Red. Co., operating the Brooklyn group, at Central City, is sinking the shaft to the 630-foot level. New York State people are interested in this property.

HINSDALE COUNTY.

(Special Correspondence).—R. L. Ray of Lake City, manager of the Tobacco mine, located near the top of the range between Animas river and Lake Fork of the Gunnison, states that a compressor plant will be put in at the mine and that a dam is being built to develop 350 H. P. for electric force at the mine, 12 miles from Sherman. The intention is to erect a mill $\frac{1}{2}$ mile from the mine within a few months. The mine is developed by a 1700-foot tunnel that starts in one gulch and comes out into another. The ores will average \$15 per ton, Mr. Ray thinks, and partake some of the characteristics of tellurium. This mine is one of the highest in the State, being nearly 14,000 feet altitude. The stockholders are Indianapolis men, mainly.

Lake City, Aug. 5.

A strike has been made in the Minnie Gulch mine at Eureka. In the stope from No. 2 tunnel 2 feet of ore has been opened up in a 7-foot vein. Assays give from 3.5 to 4.5 ounces of gold to the ton, besides silver values.

The Golden Fleece mine at Hotchkiss has been producing a large amount of rich ore from a shoot developed in the tunnel. The first car shipped netted over \$1400, and the second car \$1575 for less than ten tons. An upraise will be made to a connection with the upper workings.

SUMMIT COUNTY.

Dredger work on the Swan river, near Breckenridge, in charge of B. S. Revett, has resulted in reaching the bedrock at 40 feet in one place and the finding of unusually rich bedrock wash.

GUNNISON COUNTY.

The Doctor mine on Spring creek, about 20 miles north of Gunnison, has been started up under a lease and bond by M. Ferrell of Aspen. He is shipping good ore.

The Southwestern Smelting Co., representing Denver and Chicago capital, is putting up a 100-ton smelter at White Pine to handle the low-grade lead ores of the district. E. C. Eddie of Denver is in charge of construction.

LAKE COUNTY.

(Special Correspondence).—The Evelyn is located at about the highest point on Carbonate hill, above Leadville. A shaft was sunk thereon to 900 feet depth, which went through 800 feet of porphyry, then into a lime stratum, a sheet of chert being found in the lime carrying an iron sulphide ore that sampled about thirty ounces silver to the ton. The find was something of a surprise to many mining men, as the locality had been regarded as a barren zone. Ex-Governor Thomas, C. C. Parsons, Maurice Starke and others are in control of the Evelyn.

Leadville, Aug. 10.

(Special Correspondence).—Manager Schwarz of the Iron-Silver mine reports the production of about 5500 tons of ore per month, the bulk of which is shipped direct to the smelters, a small percentage being run through the mill for the pur-

pose of making a separation of the zinc sulphides from the iron-lead material. A considerable part of this separation is effected by sorting in the mine. In the Stevens shaft, on this group, a drift is being run for the contact. A pump is being installed in the Stevens shaft and a 125 H. P. boiler is being put in at the Moyer. Leadville, Aug. 12.

An important piece of work has been started by H. I. Higgins of the Leadville Tunneling & Drainage Co., which owns the Homer placer at Leadville. It is sinking a shaft 2000 feet west of the Rio Grande tracks and north of the boulevard. A 60 H. P. boiler has been set up, and a hoist put on the ground. This is a portion of the Leadville basin that has never been explored.

The Montezuma M. & P. Co., an English corporation, is operating near Coaldale. A tunnel is now in about 400 feet. The ground is being prepared for a settlement to be called Pleasanton. E. L. Barnes is manager, Mr. Wile of Australia metallurgist and D. E. Wilson of Canyon City has charge of building operations.

The Copper City M. & M. Co. has been incorporated; capital \$1,000,000; L. E. McDougal of Canyon City president and F. B. Archer of Bellaire, Ohio, secretary. The company owns seven claims in Copper gulch, near Canyon City. In the tests of ores made the values have run from \$5 to \$133 in copper per ton.

The production of the Fanny Rawlings, at Leadville, is maintained by the South Winnie Leasing Co. at about four to five tons per day, the ore being hauled by wagon to smelter at Leadville.

The New Monarch Co. has opened up the Fannie Rawlings ore body. The shaft has been sunk to a depth of 700 feet, the sulphide having been followed down for over 100 feet. Water is now coming in and pumps will have to be installed shortly. The values are improving with depth, and it is estimated that there are at least 100 feet more depth of the ore body.

MINERAL COUNTY.

The American Sulphur & M. Co. is developing its sulphur deposits. Its claims make an area 6 miles in length and 4 miles in width, making a total of 15,360 acres. The vein on the Pickett claim, the first developed property of the company, has been opened by a pit and ore exposed running over 75% sulphur. The diamond drill bore on the lower drift of the same claim is said to have disclosed another layer of sulphur below the body near the surface.

PARK COUNTY.

J. Moynahan, who has been doing development work on his J. G. Blaine mine at Alma, reports a discovery of a 9-inch streak of sulphide ore at the surface.

PITKIN COUNTY.

A strike on the Empire mine at Ashcroft, owned by Capt. Green, is reported. The ore vein encountered is several feet between walls and carries good values in silver and lead. J. Canning and B. Brown of Aspen have taken a lease on the mine and are prepared to extensively develop it.

The Little Tom M. Co. has been incorporated at Aspen; T. Beck is president and G. E. Guthrie secretary. The company is working on the Unexpected and Little Tom claims, near Tenderfoot. The company is engaged in cleaning out and retimbering the tunnel, besides developing other portions of the property by sinking an incline.

PUEBLO COUNTY.

J. B. Grant, J. F. Campion and J. W. Springer have incorporated the Ideal Portland Cement Co., capital \$500,000, to operate quarries, mines, clay lands, coal mines and cement mines, and to manufacture Portland cement. The operations of the company, it is stated, will be carried on principally in the counties of Arapahoe, Fremont and Pueblo. The principal offices will be located in Denver.

SAN JUAN COUNTY.

The Champion group No. 1 at Silverton has been bought by E. S. Bacon of Boston, Mass., as trustee for Boston people from E. H. DeVore. The Champion mine consists of three claims, developed by a 125-foot tunnel, opening up an ore shoot for 100 feet. E. H. DeVore is Supt.

Work is steadily progressing on the Idaho properties, Kendall mountain, Silverton, with good results, under the management of O. Hanson. The No. 3 tunnel is now in 1000 feet. No. 2 tunnel, 400 feet above, is in 800 feet, and No. 1 tunnel, 150 feet farther up the mountain, is in 700 feet. The tunnels are in milling ore. Upraises will be made connecting the tunnels. A compressor plant will be added to the equipment.

The Specie Payment G. M. Co. has been incorporated by Colley & Co. and associates of Boston, Mass., to operate the Specie Payment mine, near Georgetown, which the company has bought from E. J. Williams for, it is reported, \$625,000.

The development work consists of two tunnels aggregating 1500 feet, and a 475-foot shaft on a vein from 3 to 20 feet wide, the smelting ore of which runs \$85 a ton, and the remainder \$5 to \$7.

SAN MIGUEL COUNTY.

The sale of the San Bernardo mines on Sunshine mountain, near Telluride, has been closed and the first payment has been made. The buyers are W. A. Otis and Shove, Aldrich & Co. of Colorado Springs. The group comprises five patented and five unpatented lode claims extensively developed, two patented mill sites, a sixty-ton mill, tramway and water power. A. B. Litchfield is consulting engineer and manager for the buyers.

The Four Metals Co., operating a group of lode claims on Turkey creek, Telluride, have made a strike on the Palmyra vein which was found to be 9 feet in width between walls, 3 feet of shipping ore and the remainder good milling grade. The building of a mill at the earliest possible date is under consideration. J. H. Shockley is Supt.

TELLER COUNTY.

D. Heaton has taken an option on a block of the Wilson claim of the Free Coinage Co., located on Bull hill, near Altman. It is Mr. Heaton's intention to remove the electric hoist now in use and install a steam hoist and a compressor. The shaft is now down to the 300-foot level and is to be sunk to the 500-foot level.

The Spratt lease on the Kimberly property of the El Paso Con. at Cripple Creek has been bought by G. W. Armprister for \$7500.

A new shaft is to be sunk on the Little Queen claim of the Ben Hur Co. at Cripple Creek to a depth of 800 feet at a cost of \$40,000, the work to be started as soon as the meeting of the stockholders is held and the capital stock of the company increased.

The semi-annual report to June 30th of F. J. Campbell, secretary and manager of the Anaconda M. Co., at Cripple Creek, has been made. During the period the company shipped ore of the value of \$17,111.24 gross and \$11,656.10 net; the lessees, during the same time, produced \$229,766.72 gross, from which the company received \$44,685.75 in royalties. Of the leases, the Peterson & Beam lease is first in production, having shipped a gross value of \$77,188. The Cyanide G. M. Co. comes next with a production of \$74,121.97 and D. Ogilvie & Co. third with \$47,997.04. The total output from all sources from the Anaconda properties was \$246,877.96 and the total amount of royalties \$56,341.94. The expenditures were \$40,912.14. The report of the treasurer shows a balance in the treasury of \$32,884.50 and 394,992 shares of stock.

IDAHO.

BEAR LAKE COUNTY.

J. A. Bagley, F. W. Rose, C. E. Harris, P. J. McDermott and A. D. Young are the incorporators and directors of the Montpelier C. M. & S. Co. of Montpelier. The company is capitalized at \$200,000.

BLAINE COUNTY.

H. W. Schultz of Ketchum is operating a group of nine claims on Boulder creek and is shipping ore which costs \$9 a ton to get it to the railroad at Ketchum and \$22 a ton additional for freight and treatment.

CUSTER COUNTY.

H. A. McCornick, manager of the Lucky Boy Co.'s mines and mills at Custer City, says the company is completing the new shaft, which will afford a more economical outlet to the mine. The mills will then be started up again.

IDAHO COUNTY.

A rich strike is reported made in the McKinley mine at Lucille. The upper tunnel has developed an 18-foot wide ledge carrying gold, silver and copper, an average mill sample showing \$13.85 value. Stafford & Myer have a contract to run a lower tunnel.

J. L. Dunn of Pierce City says he has bought a one-fourth interest in the Wild Rose mine and has put two prospecting mills on the property. The Wild Rose is the mine discovered by J. Gaffney this spring, from which considerable gold has already been taken by an experimental run in a small custom mill, and with mortar and pestle.

A strike has been made in the Grambrinus district, some 6 miles from Idaho City, of ore running \$80 to \$90 per ton in the Mountain Ram mine, owned by J. McCarty.

OWYHEE COUNTY.

It is reported that a body of good grade ore has been opened in the old De Lamar mine. The discovery was made in the west workings on the fourth level. The ore now showing is about 4 feet in width. The find is being opened with a view of determining its extent.

A long tunnel is being driven to open the mines on War Eagle mountain, at Sil-

ver City. This tunnel, double-tracked, will be 6000 feet long when completed, and is now in 4200 feet. It is being driven in under the old workings of the Golden Chest properties. The power for this work is transmitted 39 miles from the electric power plant on the Snake river. R. J. Anderson is manager.

On the Trade Dollar mine, at Silver City, a 13,000-foot tunnel is being driven and is now in 4600 feet. It is double-tracked and the cars are operated by mules. J. Hutchinson is manager.

MICHIGAN.

HOUGHTON COUNTY.

President Stanton of the Baltic M. Co. states that the lower levels of the Baltic mine at Houghton are showing up very much richer than in the upper levels. Two heads of the Atlantic mill, treating Baltic rock, showed an average of forty-six pounds of mineral to the ton of rock stamped, exclusive of mass and barrel work at the mine. The rock was not specially selected.

MONTANA.

BEAVERHEAD COUNTY.

(Special Correspondence).—Argenta district, 12 miles west of Dillon, was the center of much activity ten to fifteen years ago, and at present about forty men are employed there, who work the mines as leasers. The ores, so far as work discloses them, are a silver-lead carbonate. A number of shafts sink 200 to 300 feet to water level, below which the ores are believed to be generally of a baser character. In former years three small smelters operated in the district. The oxidized ore runs high in iron, as high as 70% lead carbonate, and 20% silica, with small percentages of galena and zinc. The lessees, of course, look for and mine the higher grade shoots. Shipments of such ore in small lots have amounted to 50 to 100 carloads per year for the last three or four years. The ore is found along a lime belt, the latter lying between syenite and granite. A move is being made at Dillon to establish a sampler to buy ore in such small lots as leasers may offer. It is believed here that the work in Argenta district will be greatly revived.

At Bannock, 30 miles from Dillon, three dredgers, each having a capacity of 3000 yards per day, are operating, one of them by electricity.

In Elkhorn district, 45 miles northwest of Dillon, some work is in progress, producing a siliceous copper and silver ore. Ten miles east of Elkhorn is the Polaris mine, in the lime belt, which yields a free milling silver ore.

On Birch creek, 14 miles northwest of Dillon, are a number of claims being developed by Butte men. The ores here are iron and copper pyrites, with some bornite.

On Stone creek, east of Dillon, two Chicago companies are opening some properties, developing copper ore.

A little oil prospecting southeast of Dillon has resulted in finding strata of shale, bearing paraffine and asphaltum, which is said to be similar to the surface oil showing at Florence, Colo.

Dillon, Aug. 11.

FERGUS COUNTY.

Wright & Wright have men at work prospecting the Golden Discovery group, at North Moccasin. On this claim ore has been exposed in several open cuts and a 50-foot tunnel is all in low-grade cyanide ore.—Russie & Schiller are working on the White Elk claim, adjoining this group, and have some cyanide ore developed at the surface.—Graham & Wareham are driving a tunnel on the Stand Pat claim to tap a body of ore opened in a shaft higher up, which carries average values of \$5 per ton.—Wareham & Sutor are prospecting on the Mountain Rat claim, which shows some cyanide ore at the surface.

The Eagle mine, near Lewistown, has been bonded by Ornbau & Barnes to G. W. Tower of Butte at \$50,000 for five months. Considerable development has already been accomplished on the Golden Eagle and the Eagle Extension claims, and some high-grade ore has been taken from them. The ores are smelting ores carrying values in gold, silver, lead and copper, but the values in gold are by far the greatest. The bonding parties agree to maintain men at work on the ground.

JEFFERSON COUNTY.

J. G. Mizer, vice-president of the Eva May M. Co., operating near Basin, says that the Eva May has passed the prospect stage and is a mine. It has a shaft 650 feet deep and a solid body of pyritic ore 3 feet wide, carrying copper, silver and gold. Considerable of it assays as high as 13% copper. The company is shipping concentrates steadily, and has expended about \$340,000 in the purchase and development of the mine.

The American S. & R. Co. of Helena has bought a one-ninth interest in the

Montana Central and Monarch lode mining claims, paying for it \$1677.67. The property belonged to the Largey estate.

LEWIS AND CLARKE COUNTY.

J. Onwiler and T. J. Burt have five claims on iron veins near Butler and are down 14 feet on a vein 10 feet wide. It carries 43% iron, \$1.20 gold and 90 cents silver.

D. Panches is down about 140 feet on his copper mine at Butler and finds chunks of ore which are almost native copper, for some of it carries 80%. This ore is now shipped to Butte.

The owners of the Cosmopolitan mine, near Helena, propose to prospect the lead with a diamond drill to a depth of 2000 feet. The claim is owned by J. Cruise, T. H. Carter, J. B. Clayberg and others.

MADISON COUNTY.

The Little Darling mine, on Old Baldy, near Sheridan, is to be operated by J. E. Hatfield and S. Thomas. This mine has produced some rich rock and is developed by several tunnels and a shaft.

The Finch Bros., who own a little gold mine in Norwegian gulch, near Norris, are said to be taking out about \$14,000 daily. The mine consists of a vein of gold-bearing quartz between 5 and 7 inches wide. The two brothers mine out the ore, crush it in a hand mortar and then separate the gold in a gold washing pan.

The Clipper and Boss Tweed mines, at Pony, have been bought by the Amalgamated Copper Co., represented by J. Gillie, at a price said to be about \$1,000,000.

The ore body has been struck in the winze which R. A. Bell has sunk from the fourth level of the East Pacific mine at Winston, and it is as rich and as large as in the upper levels. Preparations are being made to increase the shipping facilities.

PARK COUNTY.

The Bald Butte Co. at Jardine has a dividend record of \$1,042,048. The mine originally cost \$10,000. About half a ton of ore was taken from the mine during July, assays from which run from 300 to 1900 ounces gold.

SILVER BOW COUNTY.

It is reported that ore has been struck in shaft No. 3 on the McQueen placer, at Butte, by F. Farrell. The shaft struck the solid formation at a depth of 95 feet, and is now down about 200 feet. The vein struck is said to be about 5 feet wide, having in it several streaks of copper glance.

NEVADA.

ELKO COUNTY.

The White Rock G. M. Co. of Elko, of which W. D. Higginbotham is Supt., will begin operations on its property soon. The company has both quartz and gravel ground, and proposes to do considerable development work this season.

LINCOLN COUNTY.

The Southern Nevada M. & M. Co., is building a 7-stamp mill at the Pegrew group of mines at Searchlight. The owners of the property are Buffalo and New York capitalists. F. C. Pegrew is superintendent.

LYON COUNTY.

The Bluestone copper mine in Mason valley, owned by Butte, Mont., men and managed by C. C. Batterman, is worked through a tunnel. The ore carries gold and silver, but copper predominates. The company employs about 200 men in the mine and smelter, the latter reducing an average of 120 tons daily.

Benton & Kennedy have sold the Imperial mine and mill, in Kennedy district, to an Eastern company represented by C. S. Wynn of New York.

ORMSBY COUNTY.

R. Logan has bonded the Quill mine, near Carson, for \$13,000. This mine is a copper proposition, the ore carrying considerable gold. It is understood that the property will be developed at once.

WASHOE COUNTY.

G. H. Wedekind and J. Sparks, owners of the Reno Star mine at Reno, have been put under a temporary injunction restraining them from exploring or taking ore out of the Desert King M. Co. ground, the Bell claim. This is the ground given to the Reno Star owners by the Nevada State trial court decision.

R. W. Summers has declined a big offer for the Forlorn Hope mine at Olinghouse. He is down 180 feet in 18 inches of \$108 sulphide ore. — Proctor & Allen are crosscutting at a depth of 170 feet. They have passed through 33 feet of low-grade ore without reaching the hanging wall. — It is reported that a strike has been made on the Woodchopper mine, owned by Sheehan, Sheehan & Nelson.

E. A. Norcross and others of Reno have incorporated the Gold-Copper Ex. Co., with office at Reno. The company has bought the Norton mine, a free-milling gold ledge, at Pyramid. For some months sinking and crosscutting on the ledge has been done.

WHITE PINE COUNTY.

The Sapho M. Co., at Ely, is reported to have made a strike in their new tunnel, the ore showing copper carbonate and assaying up to 21.5% copper. F. E. Wilson, manager, reports from 15 inches to 2 feet of an ore streak in a 10-foot vein, with a carbonate of iron as a gangue. The management propose to sink on this ore to develop sulphides which will justify the building of a pyritic smelter.

The Dexter mine at Tuscarora has shipped gold bullion valued at \$5700, and cyanides worth \$2200 more, from the last fifteen days' mill run. The production for the first half of the month amounted to \$6800, making the total for July over \$15,000. Sec. G. E. Airis at Salt Lake, Utah, says the output is a gain of \$4000 over any previous month's record.

NEW MEXICO.

DONNA ANA COUNTY.

The Ajax M. Co., with office at Las Cruces, has been incorporated, with \$500,000 capital. The directors are P. Moreno, R. C. Hatton, H. B. Lane, R. L. Young of Las Cruces and O. C. Snow of Mesilla Park.

GRANT COUNTY.

Bates & Maroney have completed their contract for sinking 50 feet on the mine of the Silver City Turquoise Co. at Burros. Crosscutting will be done at the 50-foot level. The company is also sinking a winze from the 80-foot drift.

RIO ARriba COUNTY.

The Las Tusas M. & M. Co. of Michigan, L. L. Trout manager, have started operations developing a group of claims at Bromide.

SAN MIGUEL COUNTY.

Fifteen mining claims near Las Vegas have been bought by J. P. Hill, G. Dodge, G. H. Waterbury, H. P. McIntosh and associates of Denver, Colo. The claims cover a tract of 320 acres and were sold by A. R. Quinley and J. A. Baker. The rock bears copper ore and one of the conditions of the sale is that a large mill shall be built to work the ore by a leaching process.

OREGON.

BAKER COUNTY.

The Belcher mine, near Alamo, has been bought by Eastern people for, it is said, \$75,000. G. W. Daines of Danville, Ill., is president and principal stockholder. Of the six claims in the mine, only the Belcher and the Gold King have been developed.

The Gallagher mine, in the Burnt River district, near Baker City, has been bonded to J. Harrington for, it is said, about \$50,000, on ninety days' time.

The Rachel mine and five adjoining claims, owned by the Gold Ring M. Co., have been bought by L. M. Kent of Danville, Ill., for \$10,000 cash. This group is near the Virtue mine at Baker City. The Rachel is an old property which has been worked for a number of years.

J. Gallagher has bonded the Gallagher mine, in the Burnt River district, near Baker City, to J. Harrington, for ninety days, at \$5000. The mine has not been operated for three years.

GRANT COUNTY.

The Dixie M. & S. Co., Hauser, manager, at Dixie Butte camp, has bought the smelter at Sumpter and has moved it to Dixie Butte. The company is opening a copper mine.

JACKSON COUNTY.

An English company, represented by Wm. Bailey of Palmer creek, has bonded a portion of Missouri Flat, near Jacksonville, with the intention of working it as a big placer proposition.

G. L. Davis, J. B. Dent and E. Bebler have incorporated the Rogue River Quicksilver M. Co., to operate quicksilver mines in Jackson county. Its capital stock is \$250,000 and place of business Medford.

JOSEPHINE COUNTY.

The old quicksilver mines near Cinnabar, south of Grant's Pass, have been bonded by I. Humason and H. Cowgill, who propose to operate the mines.

At the Mountain Lion, near Grant's Pass, another pay streak of very rich rock has been found. — The Baby mine, on Jump Off Joe, is producing ore which goes \$50 to the ton. A 2-stamp mill has just been erected on this property. — The Exchequer and Rising Sun mines on Applegate river have been equipped with a new hoisting engine.

LANE COUNTY.

The Lucky Boy M. Co. of Eugene proposes to begin work at once on its electric power plant on Blue river. The plant is estimated to cost nearly \$30,000, and is designed to supply power to other operators as well as operate their own mine and mill.

WALLOWA COUNTY.

Hibbs & Barton have bonded a part of their group of copper claims on the Im-

naha to the Fargo company, represented by L. D. Lively, for \$15,000, \$2500 down.

SOUTH DAKOTA.

LAWRENCE COUNTY.

A semi-official announcement has been made by the Homestake Co., concerning the operations of their 1200-ton cyanide plant at Lead, on a three-months run on the mill tailings. The plant treated 1200 tons daily, the average value per ton, \$1.50. Of this about 70%, \$1.05, was saved. It is estimated that the company nets \$1000 per day from the plant. The tailings are first concentrated, the concentrates being sent to the smelter. There are fourteen mammoth tanks in the cyanide plant, each with capacity of 600 tons. It requires from six to seven days for treatment, two tanks being filled and emptied daily.

The American M. Co., Ragged Top, J. Madill, Supt., which is drifting from the shaft on Spearfish creek to intersect the shaft put down at Ragged Top, has already followed the lower Cambrian ore measures for a distance of 1606 feet. The distance between the two shafts is 6000 feet and in order to maintain the present progress large pumps will be added and another 300 H. P. boiler will be installed. The present inflow of water that has to be pumped is said to be 1000 gallons a minute.

PENNINGTON COUNTY.

T. P. Williams of Hill City has shipped four carloads of spodumene to New York. The rock carries from 3% to 6% of lithia.

The Deadwood Standard G. M. & M. Co. has been incorporated to build a 200-ton cyanide plant at Ragged Top and to work a mine bought from E. Hanschka of Deadwood, who retains an interest.

UTAH.

BEAVER COUNTY.

The Gold King mine, in Star district, has been sold by Forgie Bros. to Morrison & Bettles of Salt Lake City, who have turned the mine over to P. A. H. Franklin for the Bluebird Co.

BOX ELDER COUNTY.

For the development of the Homestake group of seven mining claims, situated in Park Valley district, the Excelsior G. M. & M. Co. has been incorporated in Salt Lake City, capital \$25,000, with W. A. Hodges president and F. Hodges secretary.

GRAND COUNTY.

The Pilot Mountain M. & M. Co. has been incorporated; capital, \$15,000. S. C. Carpenter is president and C. L. Bryson secretary. The company owns the Snow Bank and Lucky Boy claims at Basin City.

SALT LAKE COUNTY.

The Leona mining claim at Bingham has been bought by the Ben Butler M. Co. from T. B. Beatty for \$13,000. The mine, which is patented, adjoins the original holdings of the Ben Butler on the south.

SUMMIT COUNTY.

The City Rocks mine at Alto has been bought by M. Dusseldorf, A. Hanauer, Jr., and associates of Salt Lake City from J. B. Haggin of New York, the estate of R. C. Chambers and their associates. For several years the City Rocks group has been shipping ore containing copper, silver and gold, with some lead, but the output has been limited.

The Bonanza Con. M. Co. has been incorporated in Salt Lake City to operate the Dodge group of fourteen claims lying south of the Little Bell at Park City. The company is capitalized at \$150,000. W. H. Dodge is president and R. B. Hughes secretary. Material is already being delivered, and the tunnel, now in 387 feet, will be pushed to the vein, about 100 feet farther on, from which very rich ore has been taken.

TOOELE COUNTY.

The report of C. H. Dern, assistant manager of the Con. Mercur G. M. Co., shows that during a period of eleven months ending June 30 last the company mined and milled 238,295 tons of ore. From this the product in gold bullion was \$1,493,993.80, out of which dividends amounting to \$235,000 were paid, and a balance amounting to \$273,809.96 was carried forward. It is further shown that in the milling of the ores a saving was made of \$5.18 per ton, while the contents of the tailings were reduced to 95 cents, with a gross value of \$6.13 per ton on the crude ore. The extraction of ores, the milling of them, the paying of salaries, etc., entailed a cost of \$3.18 per ton, or \$918,270.40, which left the company a net profit of \$2. In addition to the operating expenses, \$61,553.87 was paid out for improvements on the mines and mills, while at the closing of the report the company had in stock in its storerooms, supplies, etc., of the value of \$99,398.72.

UTAH COUNTY.

The American Copper M. & M. Co. has

been incorporated, with T. R. Cutter as president and J. Y. Smith secretary and treasurer. The capital stock is \$250,000, and the company owns five claims located near Simpson Springs. The ore carries a high per cent of copper and some values in gold. W. F. Butt is manager.

WAYNE COUNTY.

E. T. Wolverton describes a lead and silver proposition on Miners' mountain, 25 miles from Loa, as lying in carbonate deposits similar to those at Leadville. Assays give values of \$50 and upward in silver and lead.

N. L. Sheffield of Loa states that he and J. Grant have bonded the Silver Gance group of galena mining claims to E. J. Wolverton for \$10,000. Ore from this mine has assayed 39% lead, 3.4 ounces silver and 80 cents gold per ton.

WASHINGTON.

FERRY COUNTY.

The Phil Sheridan mine at Sheridan, near Republic, operated by J. Cronin, is operating satisfactorily. The shaft is down 100 feet and shows an ore body 4 feet in width. The ledge is considered to be wider and more uniform in value at the present level than at the surface.

WYOMING.

CARBON COUNTY.

The Haggarty-Jordan C. M. Co. has bought the Vulcan group of claims at Grand Encampment. The development on this group has been considerable and copper ore running as high as 40% has been opened.

FOREIGN.

BRITISH COLUMBIA.

The Prospectors' Exchange at Nelson reports that on the Camborne mines, Lardau district, bonded by the Rosenberger Syn., twenty men are now employed on development work. There are six veins from 8 to 45 feet in width, with ore averaging from \$6 to \$60 per ton. — Operations have been resumed at the White-water mine, Salmon. There are now fifty men on the pay roll. Six hundred tons of ore were shipped to the Trail smelter during July. — The Tamarack group, Slokan district, is being developed by Spokane parties. It is reported that this mine has a 16-inch wide pay shoot of dry ore. Twenty tons of ore shipped by the owners some time ago netted \$1200. — A 10,000-foot aerial tram is to be built to connect the Silver Hill and other properties with a shipping point on Crawford bay, Ainsworth division. The tram will have capacity of 225 tons per day.

Nelson, Aug. 8.

The Wonderful mine, in the Slokan, has started shipping ore, W. W. Warner stating that forty-three tons have been sent to the smelter which he estimates will average \$70 or more to the ton.

The Onondaga mines, located on Champion creek, near Rossland, as the product of a twelve days' run on the 10-stamp mill recently completed, have \$2000. Everything taken out was sent through the mill and the material thus treated included, according to T. James, the manager, more waste, gravel and earth than it did ore. On the Maud S. considerable work has been done and about 6000 tons of good grade, free-milling ore are now blocked out.

B. C. Lowry says that there are six hydraulic plants now in operation in Atlin, and three or four other hydraulic plants are to be installed during the summer.

The second clean-up of this season at the Con. Cariboo hydraulic mine, at Bullion, J. B. Hobson manager, has been shipped. Its value is stated to be about \$115,000, making about \$315,000 to date this season.

F. M. Wells of Republic, Wash., who has a bond on the Kingston group at Hedley City, is arranging to develop the property under his personal supervision.

MEXICO.

(Special Correspondence). — The group of mines known as the Vacas and San Marcos, located 60 miles southeast of the city of Durango, was acquired several months ago by B. Clark Wheeler of Denver, Colo., and associates, who have organized the Vacas-San Marcos M. Co., to equip, develop and operate the properties. The holdings embrace 500 acres of surface. The property has been operated for years by rather crude methods. It is opened by shafts which reach 800 feet depth; and it is estimated that there are about 400,000 tons of ore in sight above that level. The new company has started a concentrating mill to operating, which is handling sixty tons of ore per day, making a product that runs 66% lead and 97 oz. to 100 oz. silver. Orders have been given for machinery to construct a new mill capable of handling 250 tons of ore daily. Mr. Wheeler states that the output of the old mill amounts to \$35,000 per month, the

mining and milling expenses amounting to about \$10,000 per month.
Durango, Aug. 5.

THE KLONDIKE.

Fifty-cents-to-the-pan gravel has been found on the lower Hunker benches. The new find adds to the prospects of that section.

A strike has been made on the ridge road, about 22 miles from Dawson. It is a smelting ore carrying copper and gold in paying quantities.

Personal.

F. R. HINDS of Butte, Mont., is in Grass Valley, Cal.

E. C. VOORHIES, of Jackson, Cal., is in San Francisco.

HENRY BRATNOBER of London is at Missoula, Mont.

G. W. THOMAS of Angels, Cal., is in Idaho City, Idaho, examining mines.

B. CLARK WHEELER returned to Denver, Colo., from Durango, Mexico.

L. E. AUBERY, State Mineralogist, is visiting Placer and El Dorado counties, Cal.

C. J. MOORE, lately in Silver City, Idaho, has returned to Cripple Creek, Colo.

J. HIGGINS of Reno, Nev., is in charge of a large cyanide plant at Guanajuatillo, Mexico.

A. CHESTER BEATTY, M. E., recently returned to Denver, Colo., from a trip to Mexico.

E. PARISH, of Newport, R. I., is manager of the Newport M. Co. mine at Fay, Nevada.

PROF. W. O. CROSBY of Boston, Mass., has been examining the mines of Silverton, Colo.

P. T. FARNSWORTH, manager of the Bullion-Beck mine at Park City, Utah, is in Alaska.

W. S. CHAPMAN of San Francisco has recently been examining mines at Silver City, Nev.

W. A. KOCH has resigned as Supt. of the Emery mines at El Dorado, Calaveras county, Cal.

W. T. ST. AUBURN, formerly Supt. Gladstone mine at French Gulch, Cal., is in New York.

N. H. NICHOLSON of Denver, Colo., is examining copper properties in Chihuahua, Mexico.

J. A. MARSHALL of London, Eng., is in charge of the Cherokee mine, Chihuahua, Mexico.

L. B. WICKERSHAM of Portland, Or., has returned from a professional trip to Seward, Alaska.

W. CHOATE, M. E., of Detroit, Mich., has recently been examining copper mines near Libby, Mont.

W. H. ADAMS, manager of the Rambler-Cariboo mine of British Columbia, is in Spokane, Wash.

F. G. GOGGIN, Supt. of the Calumet & Hecla mill department at Houghton, Mich., has resigned.

W. S. HALL, Professor of Mining at Lafayette University, Easton, Pa., is in Cripple Creek, Colo.

A. H. ELITMAN, geologist, of Minneapolis, Minn., is examining mines in Butte and Yuba counties, Cal.

J. G. MCBRIDE, of New York, manager of the Verde Apex Copper M. Co., is at the mine, Jerome, Arizona.

R. N. COWAN of Montana has been appointed amalgamator of the U. P. Co. mill at Salmon City, Idaho.

S. E. CHAMBERS of Park City, Utah, is in charge of the leaching plant of the Ophir Co. at Stateline, Utah.

W. H. FULLER of Los Angeles, Cal., president of the Osceola M. Co. at Forest City, Cal., is visiting the mine.

R. C. GEMMELL, E. M., of Salt Lake City, Utah, has gone to Parral, Chihuahua, Mexico, for a large mining syndicate.

B. C. SOULE of Oakland, Cal., and C. E. Sloane of San Francisco have gone to Nogales, Mexico, to examine a mining proposition.

P. H. WISEMAN, manager of the Shannon copper mine at Clifton, Ariz., has returned to the mine after several weeks' absence at New York.

Recently Declared Mining Dividends.

| | |
|--------------------------------------------------------------------------|---------|
| Bald Butte M. Co., Mont., extra, 6 cents per share..... | Aug. 15 |
| Doctor-Jackpot M. Co., Colo., quarterly, 1 cent per share, \$29,000..... | Aug. 28 |
| Union G. M. Co., Colo., \$25,000..... | Aug. 15 |
| Leadville Home M. Co., monthly, \$12,500..... | Aug. 20 |
| Standard Con. G. M. Co., Cal., 10 cents per share, \$17,839..... | Aug. 21 |

Commercial Paragraphs.

THE Locomobile Co. of the Pacific has moved its office and warehouses to No. 1622 Market St., San Francisco.

J. GEO. LEYNER, Denver, Colo., manufacturer of air drills and compressors, is putting in a stock of his machines at 242 South State St., Salt Lake City, Utah, where J. H. Sanborn will be in charge.

McFARLANE & Co., Denver, Colo., recently shipped concentrating machinery to the Hunter Creek mill, near Aspen, Colo., and six electric hoists to the Arkansas-McAllister Coal Co., at Hartford, Ark.

CHARLES WALLACE has produced a stamp and grinding mill which has some of the features of the stamp, combined with those of the arrastra. He has organized the New Era Machinery Co., Denver, Colo., to manufacture the machine. Associated with him are E. Truett, F. E. Bush and C. F. DuBois.

THE Colorado Zinc Co., interested in which are Henry E. Wood, A. C. Beatty and others have plans for erecting a mill in Denver, Colo., to operate on heavy, base, sulphide ores. The chief functions of the mill will be crushing, sizing and effecting a separation of the iron from the zinc material. Jesse Scooby is engineer in charge of the construction.

THE Detroit Leather Specialty Co., Detroit, Mich., announces that it has "the only plant in the world making a specialty of hydraulic leather packings." The company has special machinery, designed and built for special work, and invites correspondence from those interested in getting the best material at the lowest price.

THE Wisconsin Traction, Light, Heat & Power Co. of Appleton, Wis., recently placed quite a large order for Victor turbine water wheels with the Stilwell-Bierce & Smith-Vaile Co. of Dayton, Ohio, consisting of two units of wheels for driving the main plant, each unit containing three pairs of 42-inch Victor turbines mounted on horizontal shafts. These wheels will develop 3200 H. P. Two 24-inch horizontal wheels will also be furnished for driving the exciters. The gate work will be of the patented draw rod type, which places all gears on the outside of the flume, where they can have attention, and where they can work in oil, replacing the style of gate work where the gears run in water.

Catalogues Received.

THE Globe Iron Works of Stockton, Cal., have issued a little catalogue descriptive of the Globe battery stem guide, which they manufacture, for stamp mills. They will be pleased to mail the catalogue on application.

THE Rockwell Engineering Co. of New York have issued Catalogue C on Furnaces. It handsomely illustrates a few of the many types of furnaces, designed for every variety of service, which the company is prepared to supply. The Rockwell Engineering Co. will be pleased to mail the catalogue on request being made at their office, 26 Cortlandt St., New York.

Books Received.

"How to Become a Good Mechanic," by John Phin, 16mo., 65 pages, second edition, is a pocket volume for beginners who are learning a trade. It is intended as a guide to self-taught men, to instruct them

how to carry on a course of self-instruction which will enable them to rise higher in the trade. Published by the Industrial Publication Co., New York. Price 25 cents postpaid.

New Patents.

DEWEY, STRONG & CO.'S SCIENTIFIC PRESS PATENT AGENCY, 330 Market St., S. F., has official reports of the following U. S. patents issued to Pacific coast inventors:

FOR THE WEEK ENDING AUGUST 6, 1901.

679,933.—VENTILATOR—P. Abrahamson, S. F.
680,106.—SKIRT SUPPORTER—A. M. Adams, Portland, Or.
680,113.—MOUTHPIECE—A. Bergman, Sacramento, Cal.
679,875.—CONVEYOR—H. W. Blaisdell, Yuma, Ariz.
680,119.—DENTAL FORCEPS—F. A. Brewer, Jr., Waterville, Or.
679,942.—PENCIL SHARPENER—E. Burke, Lakeview, Or.
679,943.—PRESERVING FRUITS—F. Butcher, Healdsburg, Cal.
679,880.—RAILWAY SWITCH—Cantrell & Empey, Spokane, Wash.
679,946.—FLY ESCAPE—A. J. Collar, Yreka, Cal.
679,951.—REIN HOLDER—C. A. Conger, Oakland, Cal.
679,880.—BAILER CONNECTION—C. I. Dorn, Bardsdale, Cal.
680,029.—LUMBER CONNECTION—J. E. Dubray, Madera, Cal.
680,141.—DRIVING SHINGLES—Gibbard & Anderson, Eureka, Cal.
680,033.—MOTOR—K. Gore, Berkeley, Cal.
680,039.—WINDMILL—K. Gore, Berkeley, Cal.
679,144.—CLEANING COMPOUND—J. Hammer, Tacoma, Wash.
679,982.—SLIDING DOOR—J. Handschumacher, S. F.
679,986.—REFRIGERATOR CAR—J. Hommel, Los Angeles, Cal.
680,155.—LUBRICANT—W. M. Jones, S. F.
680,053.—FLY COVER—Madigan & Crocker, Seattle, Wash.
680,175.—GAME—M. Reinhart, Portland, Or.
680,044.—REFRIGERATOR—J. R. Simms, Linden, Cal.
680,005.—HOOK—P. B. Southworth, Mayville, Or.
679,928.—TIE KETTLE—C. E. Warren, Los Angeles, Cal.
680,104.—DESK LEAF SUPPORT—G. H. Wyman, Los Angeles, Cal.
34,887.—DESIGN—J. A. Kirkham, Portland, Or.

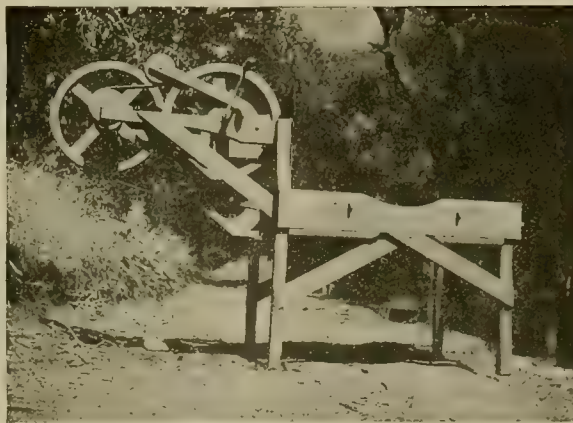
Notices of Recent Patents.

Among the patents recently obtained through Dewey, Strong & Co.'s SCIENTIFIC PRESS U. S. and Foreign Patent Agency, the following are worthy of special mention:

MEANS FOR PRESERVING FRUITS AND THEIR JUICES.—F. Butcher, Healdsburg, Cal. No. 679,943. Aug. 6, 1901. This invention is designed to prevent the decay or fermentation of the juices of fruits or of fruits or kindred products in a liquid or semi-liquid form after these products have been hermetically sealed, and where it is desirable at any time to break the seal and remove a part of the preserved contents. My invention consists in a means for sterilizing or deodorizing the air or vapor that may be employed to the barrel, or other receptacle containing the preserve, whenever any of its contents are removed, and this is effected by consuming the oxygen of the air and sterilizing it as it enters the vessel to fill the vacuum produced by drawing out the contents.

FLY ESCAPE.—A. J. Collar, Yreka, Cal. No. 679,946. Aug. 6, 1901. The object of this invention is to provide an inexpensive portable fly escape that can be inserted in any screen door, or screen window opening, and requiring little or no mechanical skill to set it in position. It includes a horizontal expandible concave base having transverse openings or outlets, a screen surface with a transparent section or continuation, and means for attaching the escape to an opening or like aperture.

VENTILATOR.—Peter Abrahamson, San Francisco, Cal. No. 679,932. Aug. 6, 1901. This invention comprises a ventilator box or air shaft divided by longitudinal vertical partition into ingress and egress air passages, with means for deflecting the air respectively downwardly and upwardly in these passages. A damper forms a part or continuation of the said partition, and is turnable to cut off the circulation.



Thurman's Portable Forge.

The accompanying cut illustrates an Improved Portable Forge recently patented to Wm. C. Thurman of Fresno.

It comprises a hearth of brick or clay having a firepit extending its full width and open at the ends; a plurality of tuyeres entering the pit; separate air passages for each tuyere, connections of these passages with the main blast pipe

of the blower; and a wing valve in the blast pipe whereby the supply of air to the tuyeres may be regulated.

The divided air inlets and the transverse fire pit permit of a large saving in coal over forges of the ordinary type where extended heating surface depends on the depth of the fire. Thus one is enabled in a small forge of the Thurman type to heat and weld large bars, axles, etc., such as require a considerable longitudinal surface to be subjected to the fire.

Latest Market Reports.

SAN FRANCISCO, Aug. 15, 1901.

SILVER.—Per oz., Troy: London, 26½d (standard ounce, 925 fine); New York, bar silver, 58½c (1000 fine); San Francisco, 58½c; Mexican dollars, 47c San Francisco, 45c New York.

COPPER.—New York: Lake, 1 to 3 casks, \$17.25; carload lots, \$17.00; Electrolytic, 1 to 3 casks, \$16.75; carload lots, \$16.62½; Casting, 1 to 3 casks, \$16.60; carload lots, 16.50. San Francisco: 18. Mill copper plates, 20c; bars, 22½c. London: £65 8s 9d per ton.

LEAD.—New York, \$4.37½; Salt Lake City, \$4.00; St. Louis, \$4.40; San Francisco \$4.90, carload lots; 5½c 1000 to 4000 lbs.; pipe 6, sheet 6½, bar 5½c; pig, \$5.25. London, £11 13s 6d per ton=2.52 cents per lb.

SPELTHER.—New York, \$4.20; St. Louis, \$3.75; London, £16 2s 6d per ton =3.58½ cts. per lb.; San Francisco, ton lots, 5½c; 100-lb. lots, 6c.

ANTIMONY.—New York, Cookson's, 10c; Hallett's, 9c; San Francisco, 1000-lb. lots, 10c; 300 to 500 lbs., 11c; 100-lb. lots, 13½c.

IRON.—Pittsburg, Bessemer pig, \$16.00; gray forge, \$14.00; San Francisco, bar, per lb., 2.65c in small quantities.

STEEL.—Bessemer billets, Pittsburg, \$24; open hearth billets, \$26.50; San Francisco, bar, 7c to 12c per lb.

TIN.—New York, pig, \$27.50; San Francisco, ton lots, 30c; 1000 lbs., 30½c; 500 lbs., 30½c; less, 31c; bar tin, 31c, 35c.

QUICKSILVER.—New York, \$51.00 large lots; London, £9 2s 6d; San Francisco, local, \$47.50 per flask of 7½ lbs.; Export, \$45.00.

MAGNESIUM.—New York, \$2.90 per lb.; San Francisco, \$3.75.

ZINC.—San Francisco, 5½c; slab, 5½c; bar, 7c; zinc dust, N. Y., 8c.

BABBITT METAL.—San Francisco, No. 1, 10c.

SOLDER.—Half-and-half, 100-lb. lots, 19c; San Francisco, Plumbers', 100-lb. lots, 15½c.

PHOSPHORUS.—F. O. B. New York 50¢ @ 60¢ per lb.

ASSAY LITHARGE.—San Francisco, 10c per lb., small lots.

BISMUTH.—New York, 3½c, \$2.25 50-lb. lots; San Francisco, \$2.50 to \$2.75 lb. lots.

PLATINUM.—San Francisco, crude, \$19 per oz.; New York, \$20.50 per Troy oz. FERRO-MANGANESE.—Pittsburg, 80%, domestic, \$58.50, large lots.

TUNGSTEN.—New York, 3½c, 95c; San Francisco, \$1.15.

FERRO-TUNGSTEN.—New York, 37%, 32c; San Francisco, 65c (60%).

NICKEL.—New York, 50¢ @ 60¢ per lb.

ALUMINUM.—New York, No. 1, 99% pure ingots, 35c; No. 2, 90%, 30c to 35c.

POWDER.—F. O. B. San Francisco: No. 1, 70% nitro-glycerine, per lb., in carload lots, 15½c; less than one ton, 17½c. No. 1*, 60%, carload lots, 13½c; less than one ton, 15½c. No. 1** 50%, carload lots, 11½c; less than one ton, 13½c. No. 2, 40%, carload lots, 10c; less than one ton, 12c. No. 2* 35%, carload lots, 9½c; less than one ton, 11½c. No. 2** 30% carload lots, 9c; less than one ton, 11c. Black blasting powder in carload lots, minimum car 728 kegs, \$1.50 per keg; less car lots, \$2 per keg.

CAPS.—3x, \$5.50 per 1000; 4x, \$6.50; 5x, \$8; Lion, \$9, in lots not less than 1000.

FUSE.—Triple tape, \$3.60 per 1000 feet; double tape, \$3.00; single tape, \$2.65; Hemp, \$2.10; Cement No. 2, \$3.00; Cement No. 1, \$2.65, in lots of 3000 feet and up.

CANDLES.—Granite 6s, 16 oz., 40s., 9½c per set; 14 oz., 40s., 8½c.

OILS.—Lined, pure, boiled, bbl., 75c; cs., 80c; raw, bbl., 73c; cs., 78c. Deodorized Stove Gasoline, bulk, 14½c; do., cs., 20½c; 86° Gasoline, bulk, 20c; do., cs., 26c; 63° Naphtha or Benzine, deodorized, in bulk, per gal., 13½c; do., in cs., 19½c; Lard Oil, Extra Winter Strained, bbl., 75c; cs., 80c; No. 1 bbl., 50c; cs., 55c. Neatsfoot Oil, cooper's bbls., 60c; cs., 65c; No. 1 bbl., 50¢ @ 52½c; cs., 55¢ @ 57½c.

CHEMICALS.—Cyanide of potassium, 97%—98%, jobbing, 31½¢ @ 32½¢ per lb.; carloads, 29¢ @ 30c; in 10-lb. tins, 40c; sulphuric acid, in carboys, 66¢ B, 2c per lb.; soda ash, \$1.90 per 100 lbs.; hyposulphite of soda, 2½¢ @ 3c per lb.; blue vitriol, 5½¢ @ 6½¢ per lb.; borax, concentrated, 7¢ @ 8c per lb.; chlorate of potash, 12¢ @ 13c; roll sulphur, 6c; alum, \$1.90 @ 2.00; flour sulphur, French, 2½¢ @ 2½c; California refined, 1½¢ @ 2c; nitric acid, in carboys, 8c per lb.; caustic soda, in drums, 3¢ @ 4c per lb.; Cal. s. soda, bbls., \$1.00; sds., 95c per 100 lbs.; chloride of lime, spot, \$2.50 @ 2.60; nitrate of potash, in kegs, 8c; caustic potash, 10c in 40-lb. tins.

COAL.—San Francisco, coast, yard prices: Wellington, \$9; Seattle, \$7.00; Coos Bay, \$5.50; Southfield, \$9.00. Cargo lots, Eastern and foreign: Wallsend, \$8.00; Brymbo, \$7.50; Pennsylvania, hd., \$14.00; Scotch, \$8; Cumberland, \$12; Cannel, \$9.50; Welsh Anthracite, \$12.00; Rock Springs, \$8.50; Colorado Anthracite, \$14.50. Coke, \$16 per ton in bulk; \$18 in sacks.

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SITUATIONS WANTED.

WANTED.—Position by a young man with several years practical experience in steam and electrical engineering. Address A. F., care this office.

WANTED.—POSITION AS HOISTING ENGINEER, Fireman or General Mechanic. State wages. J. E. MURRAY, care of Sulpho-Saline Bath Co., Lincoln, Nebraska.

WANTED.—A POSITION AS ASSAYER AND general assistant, if desired. Mexico preferred. Ten years' experience in general mining. Two years managing mines in Mexico. Have practical knowledge of the language. References furnished. Box 32, Mining and Scientific Press.

MINING ENGINEER, four years in Johns Hopkins' University, thirteen years miscellaneous work in West Virginia, desires work in the West. Address X Y Z, Mining and Scientific Press.

MILLMAN WANTS POSITION. Has had 14 years' experience. Capable of taking charge of stamps or Huntington mills. Understands thoroughly amalgamating, concentrating, and the care of mills—high or low-grade propositions; fast crusher and close sizer. Reference given. Address "millman," care Mining and Scientific Press.

A Civil and Mining Engineer (member American Society of Civil Engineers, member American Institute of Mining Engineers), at present general manager of a Western gold mining company, desires change. Will go anywhere. Examining or reporting, exploration work or operating. Address Box 264, Grangeville, Idaho.

Position as Superintendent or Millman by one experienced in wet and dry crushing, cyaniding plate amalgamation assaying, and melting of bullion. References furnished. Address B, care Mining and Scientific Press.

WANTED.

TAILINGS, SLIMES AND DUMPS WANTED. Correspondence invited respecting Refractory Gold Ores. REX, care Mining and Scientific Press.

WANTED IMMEDIATELY. A First-Class, Reliable Carriage Blacksmith.

One thoroughly competent to take charge of a shop. Excellent chance for the right man to better his position, if satisfactory. Answer by letter to P. C. JURS, 1109 Van Ness Ave., San Francisco.

FOR SALE.

FOR SALE.—1000 to 5000 Shares of the Consolidated St. Gothard Mining Co. of Nevada County, AT 30 CENTS PER SHARE. Address N. BOYAR, 429 O'Farrell St., San Francisco, Cal.

FOR SALE.—Two Claims with a Large Body of Ore in Sight, Averaging \$10.

Easy terms. Small amount of development. Address Box 100, care this office.

BELTING AND PULLEYS.

We can save you 50% on guaranteed Belting secured from mills which we dismantle. All sizes of wood pulleys that are as good as new and guaranteed.

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With buckets having capacity of seven and a half cubic feet. Dredge only used few months. Located on Grasshopper creek, near Bannack, Mont. For full particulars, address THE BUCYRUS COMPANY, South Milwaukee, Wis.

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ANNUAL MEETING.

The Regular Annual Meeting of the Stockholders of the AMERICAN OIL AND REFINERY COMPANY will be held at the company's offices, Rooms 322-323 Parrott Building, 825 to 855 Market St. in the City and County of San Francisco, on MONDAY, the 19th day of August, 1901, at 1:30 P. M., for the election of directors for the ensuing year and the transaction of such other business as may properly come before the meeting.

J. C. ANTHONY, Secretary.

McGill University, Montreal.

CHAIR OF METALLURGY.

The Governors of McGill University invite applications for the Professorship of Metallurgy. Candidates for the appointment are requested to send their testimonials, with a statement of age, qualifications, etc., to the Secretary of the University, before September 1st. The duties of the post will commence October 1st. Full particulars of the work, salary, etc., may be obtained from the Secretary.

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Parties interested in placer deposits that cannot be successfully operated, owing to a lack of water, should communicate with THOMAS A. EDISON, Orange, N. J.

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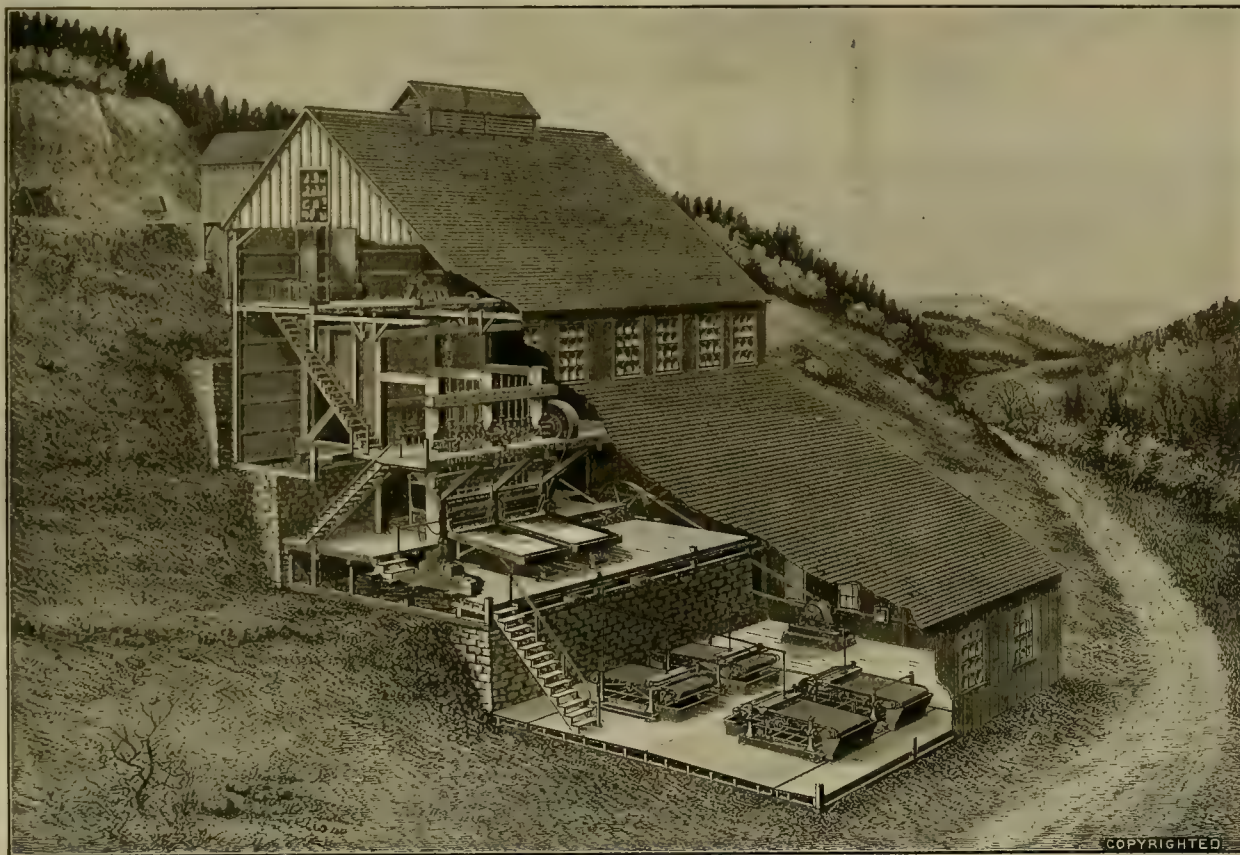
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Freight carrying capacity of wagons,
16 TONS EACH,
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ENGINE,
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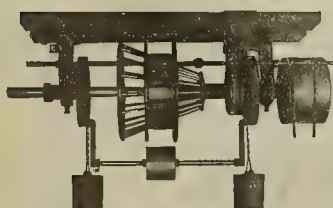
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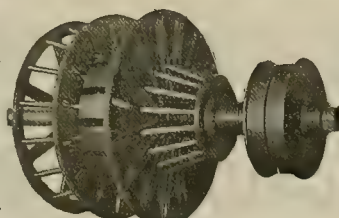
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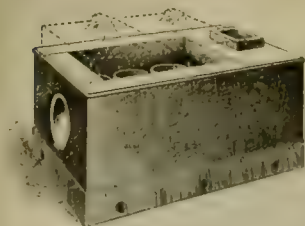
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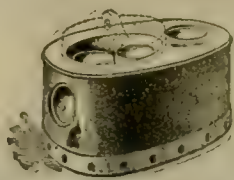
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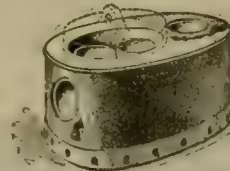
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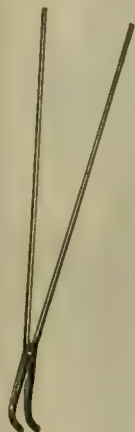
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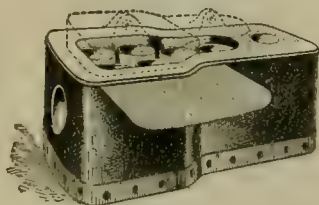
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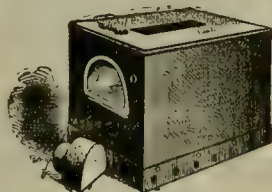
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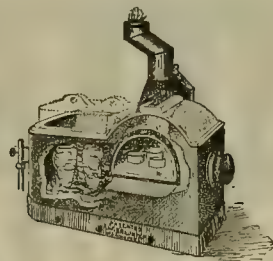
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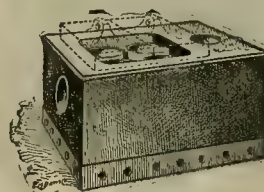
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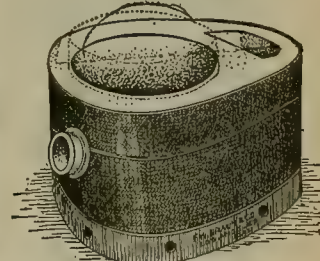
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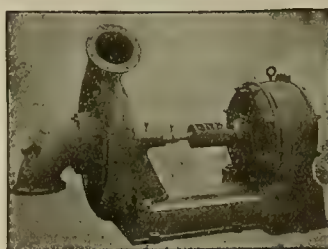
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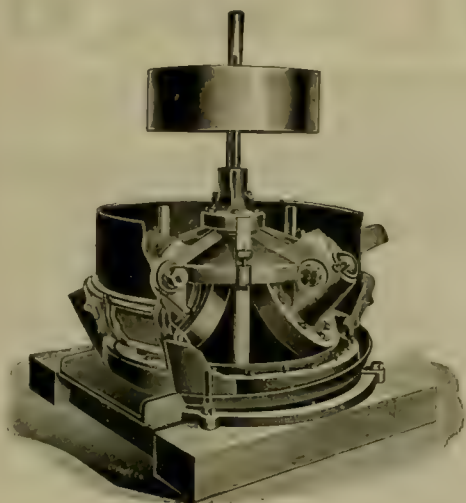
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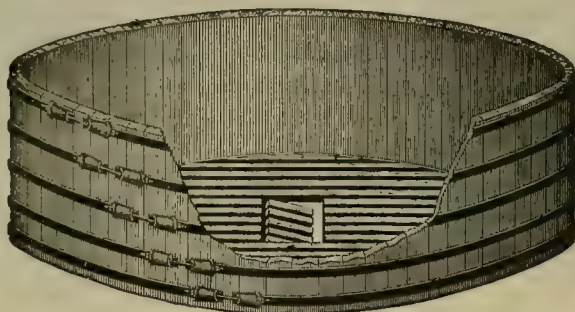
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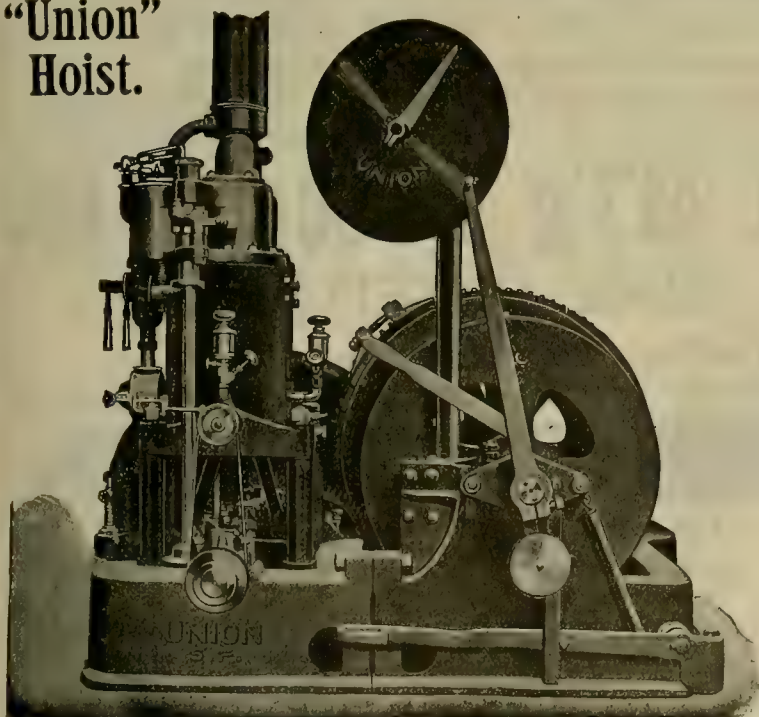


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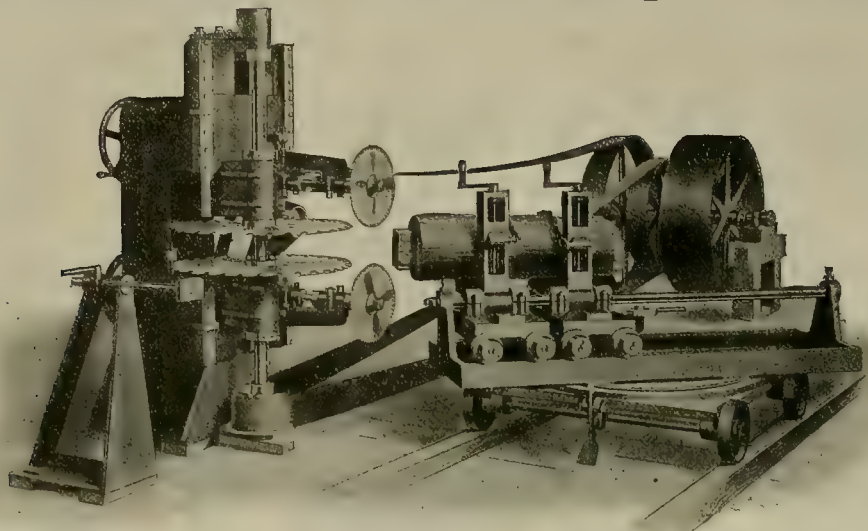
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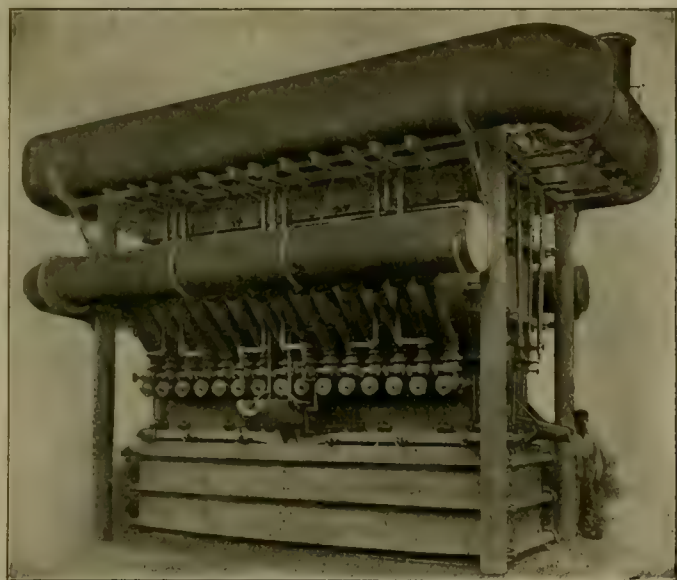
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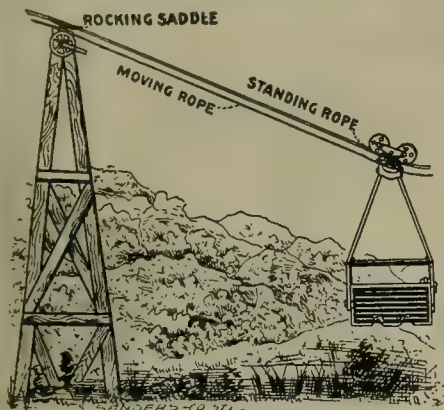
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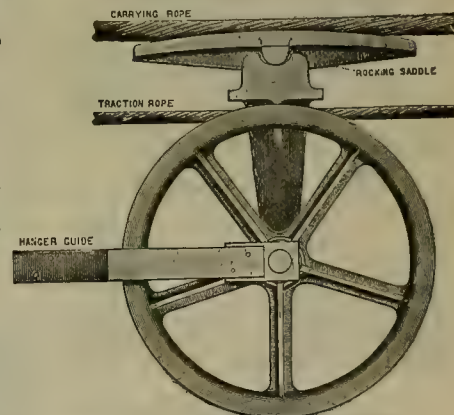
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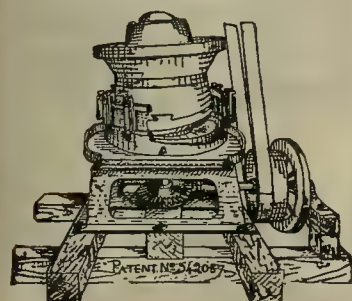


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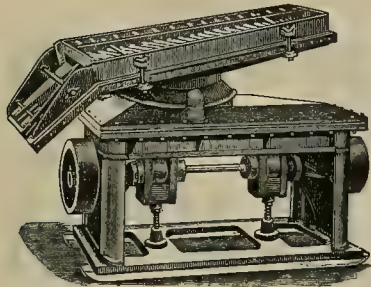
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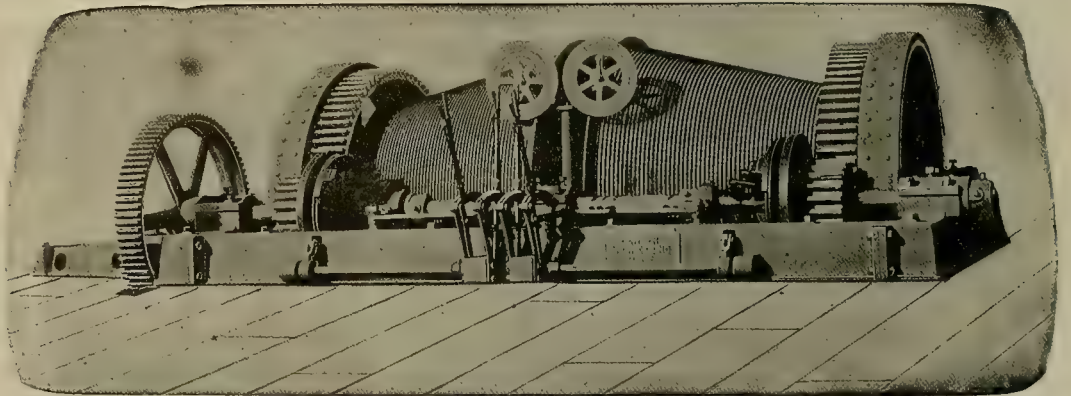
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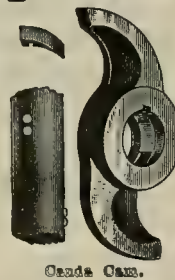
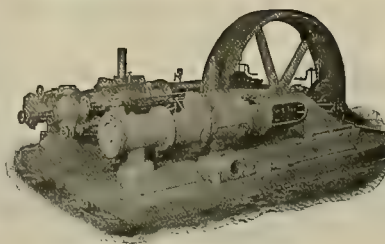


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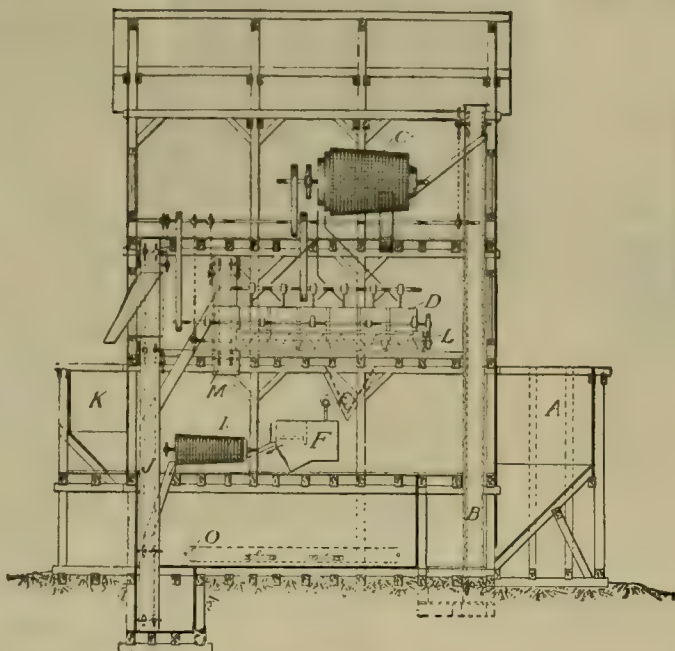
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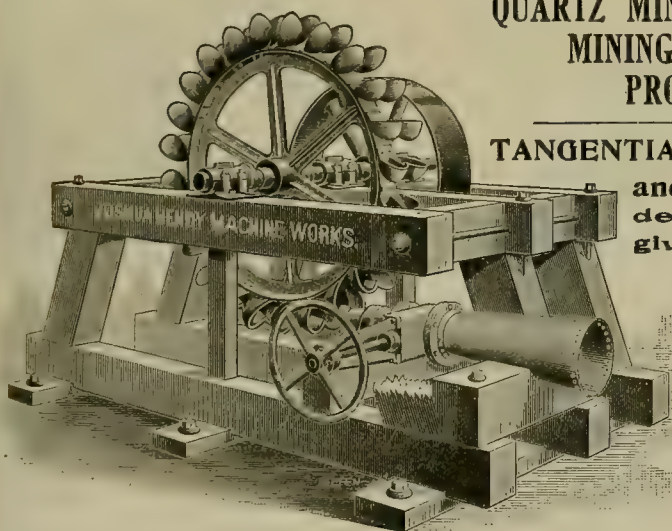
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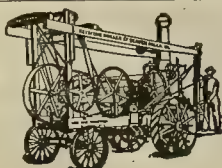
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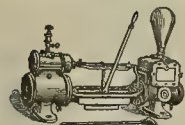
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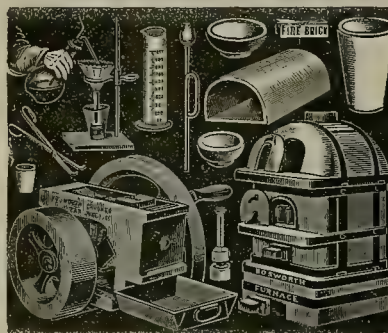
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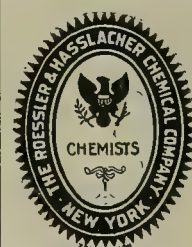
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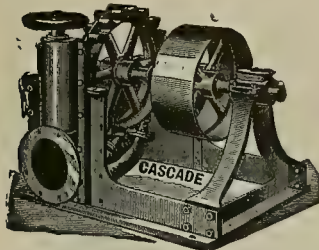
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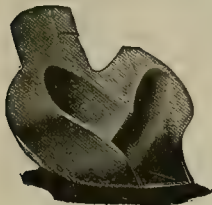
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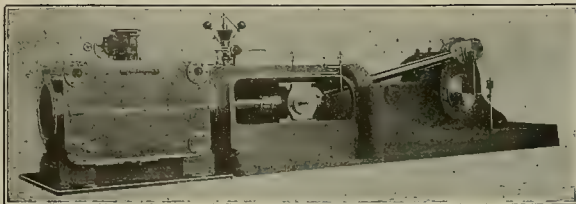
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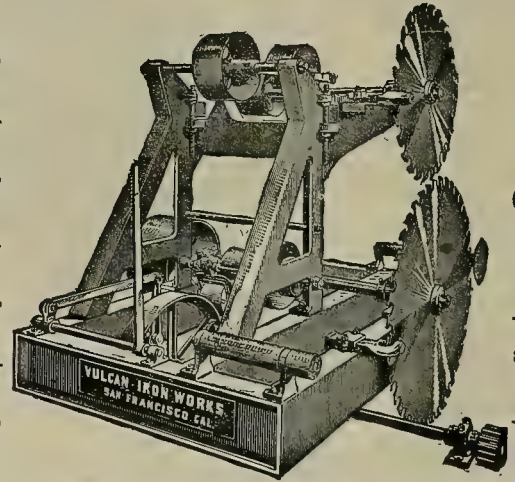
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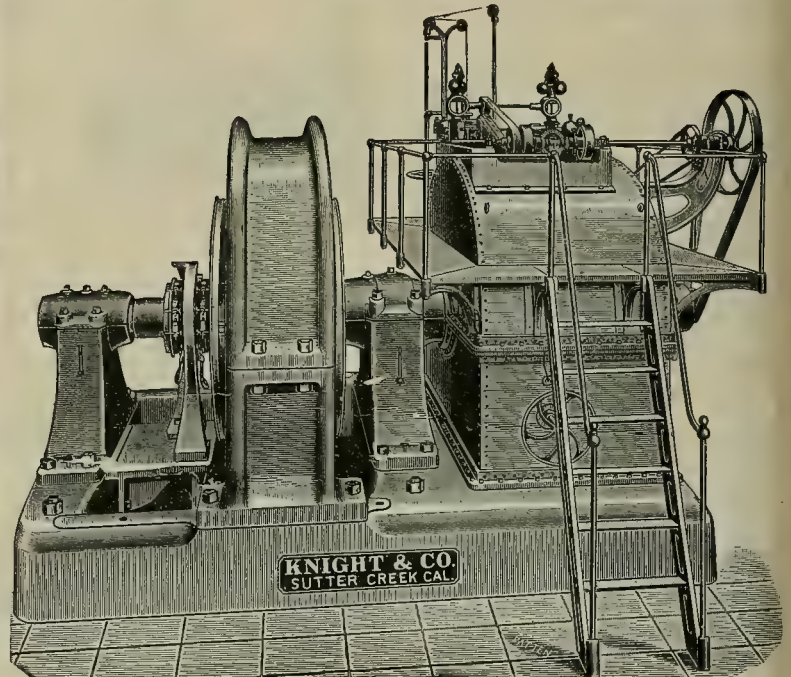
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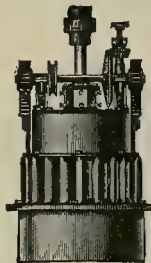
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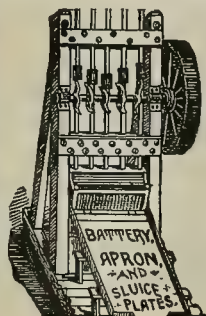
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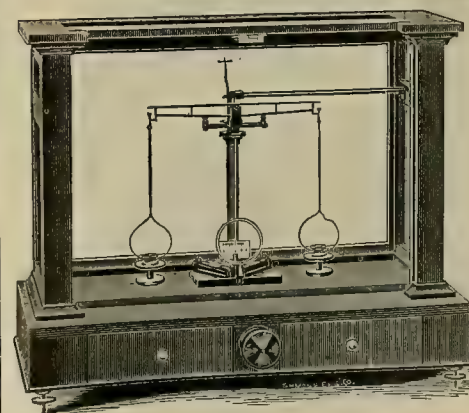
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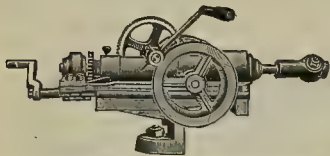
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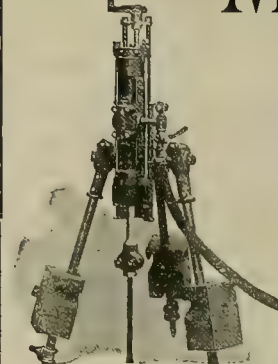


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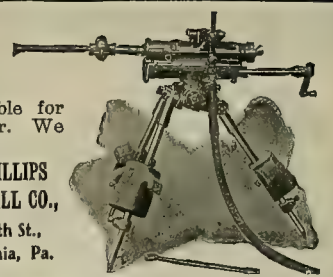
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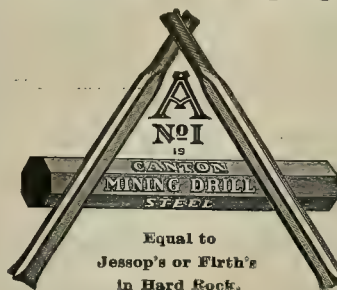
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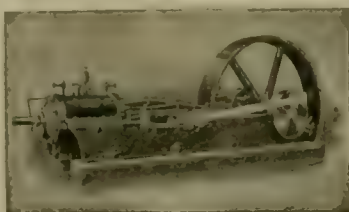
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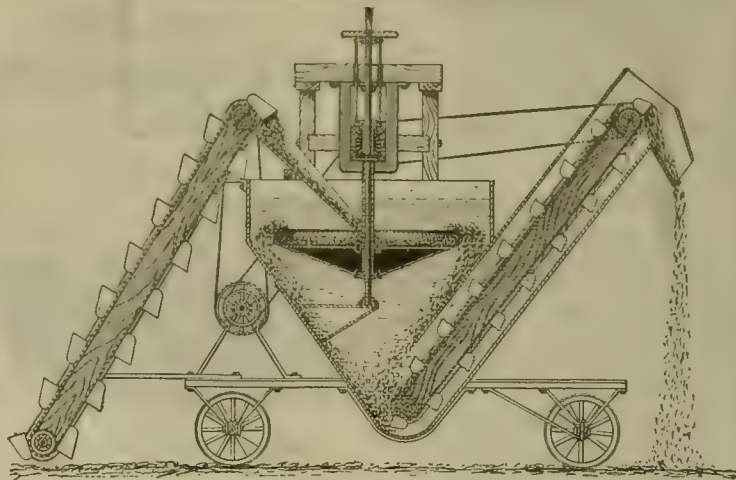
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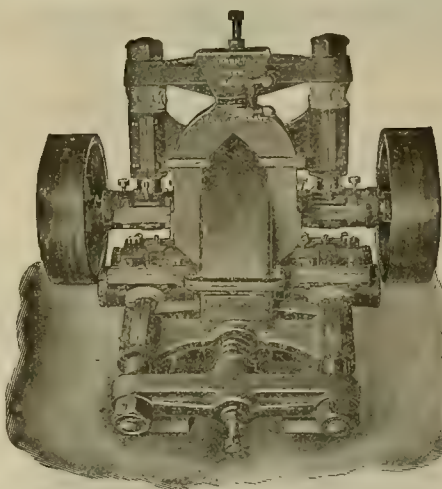
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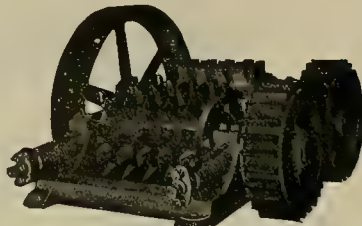
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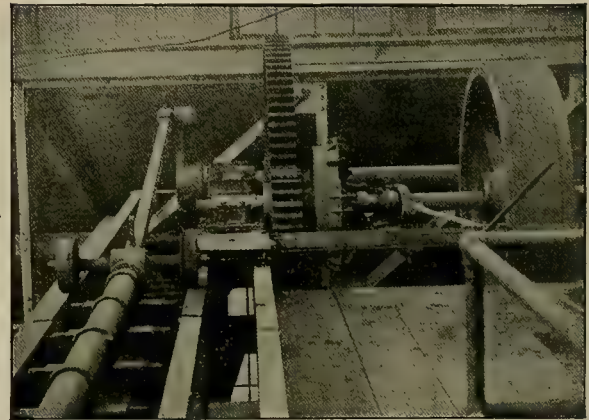
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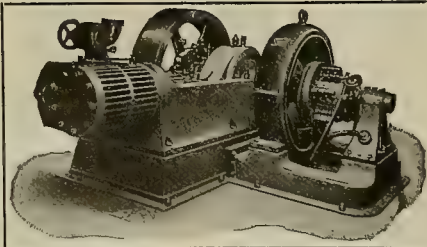
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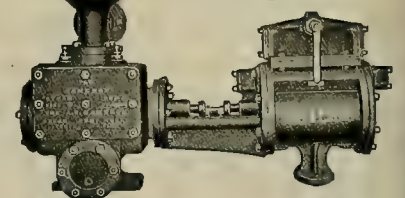
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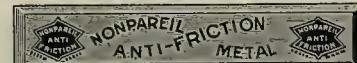
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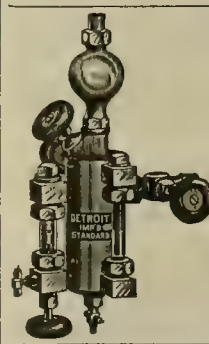
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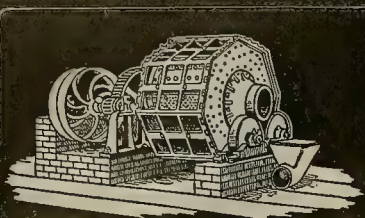
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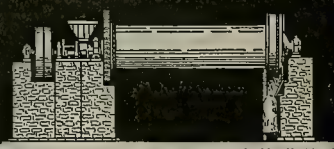
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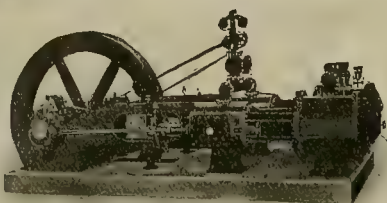
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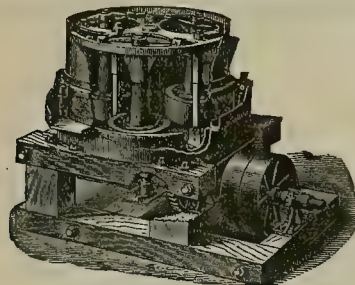
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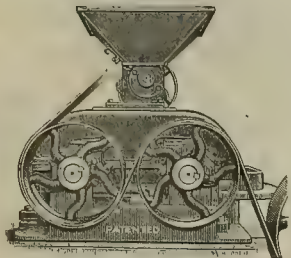
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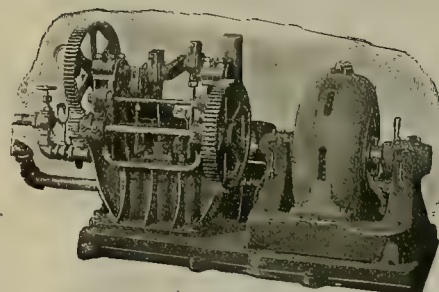
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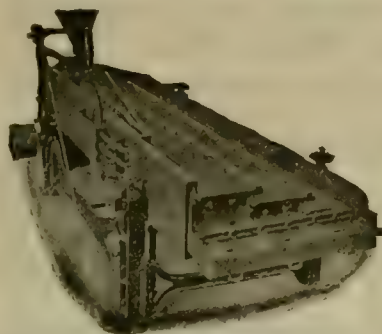
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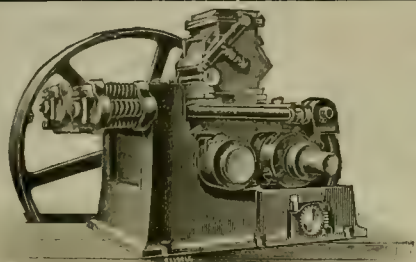
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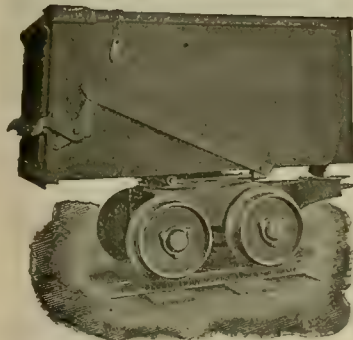
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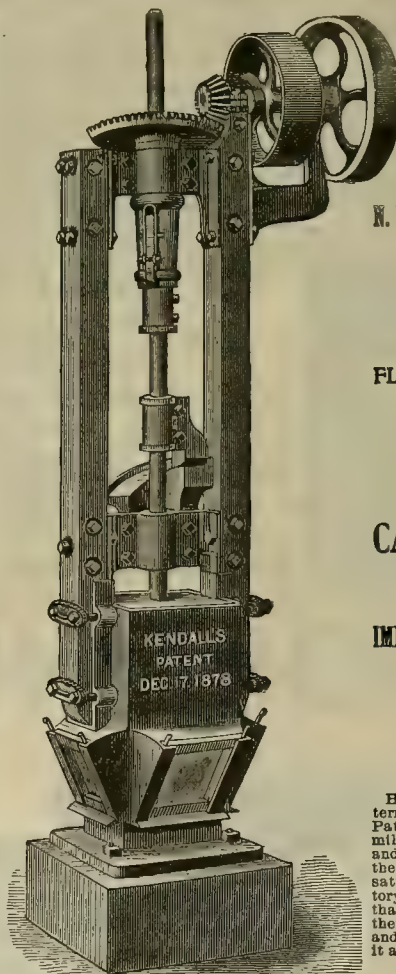
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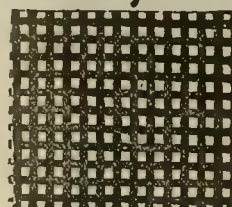
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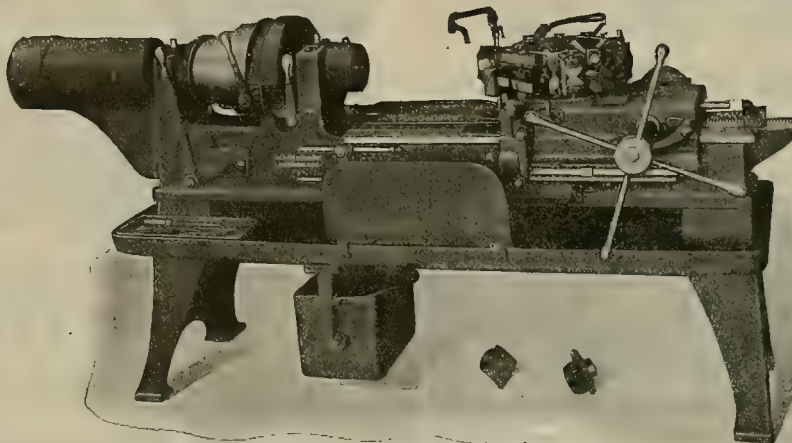
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SAN FRANCISCO, SATURDAY, AUGUST 24, 1901.

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The Mine Freight Costs.

The business of transportation is a modern science developed from the modern improvement made by engineering invention in the means of transportation. Originally—and, indeed, until the invention of the steam railroad—the business was based on gaining a profit over the cost of giving the service. The modern business is based on making the profit gain from the value of the service to the served. Originally the kind of the production transported, its market value, the margin of seller's profit, did not make the basis of charges for transportation. Now these things do determine the charges and the flat cost of the transportation is made subordinate to them.

Mining is exceptionally dependent on transportation by reason of the remoteness of the mines from the centers of population. As a cost item against production, transportation charges are now of more importance than ever before. The reason for this is lowered metal selling prices and higher unit production costs due to working poorer ores.

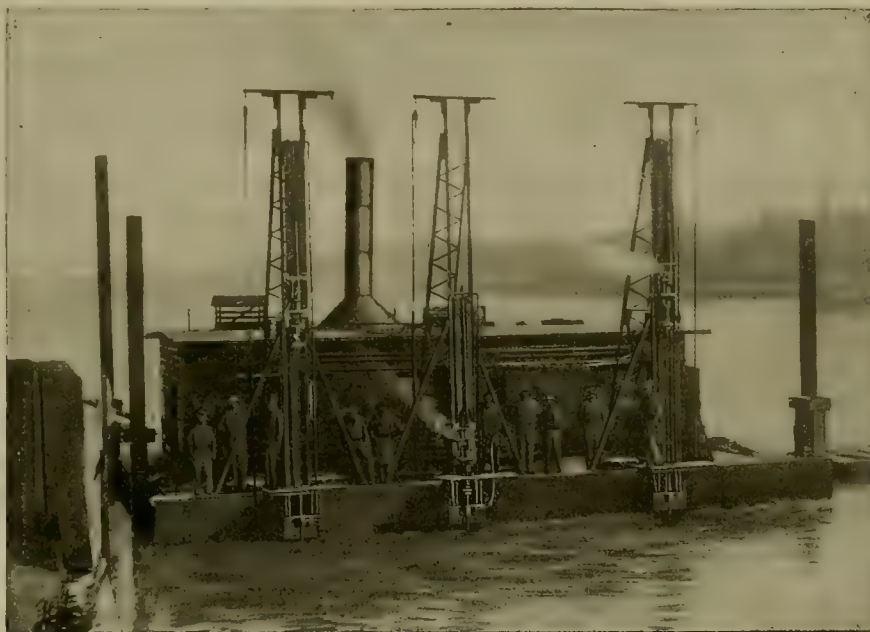
Mine operators are not backward in appreciating the condition. The problem to them is the determination of the commercial lines on which a reduction of freight costs to the economic minimum can be made. The statement above of the basis on which

certain charge for transportation to a refinery. The mine operator figures that, if the refining be done at the smelter, pure copper can be shipped instead of matte, and the freight charge per pound of copper

transportation. Nevertheless, it is the operation of this law which discourages the application of economies which have for their primary object the reduction of transportation costs.

While this is the condition of the establishment of freight costs of mining, the subject should not be passed as something that can not be helped, but should be carefully studied with reference to all the operative costs of each particular mining enterprise. There is lack of recorded detailed data concerning mine freight costs, particularly in connection with western metal mines. Of iron and coal freight costs, such detailed data have been recorded. Possessing it, the iron and coal mine operators have been able to effect economies in transportation costs. Finding out first just what freight service cost, they made the economy by starting to serve themselves. They built and owned some of their own transportation service.

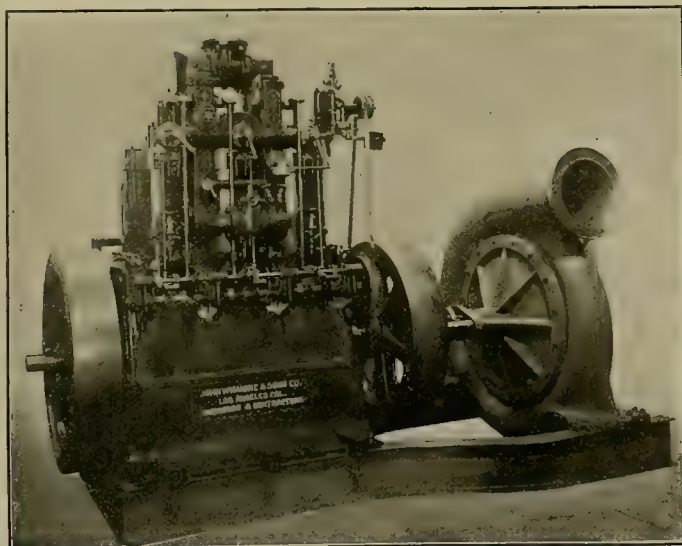
The metal miners of the western half of the United States are not as favorably situated as were the coal and iron miners of the East. They can not all build transportation facilities, or at least cannot build all the transportation facilities they need. They can, however, get the data of freight charges they are paying. They can get the data of the flat cost of the service they are paying for. With this knowledge, they have in their possession the same tools with which the coal and iron



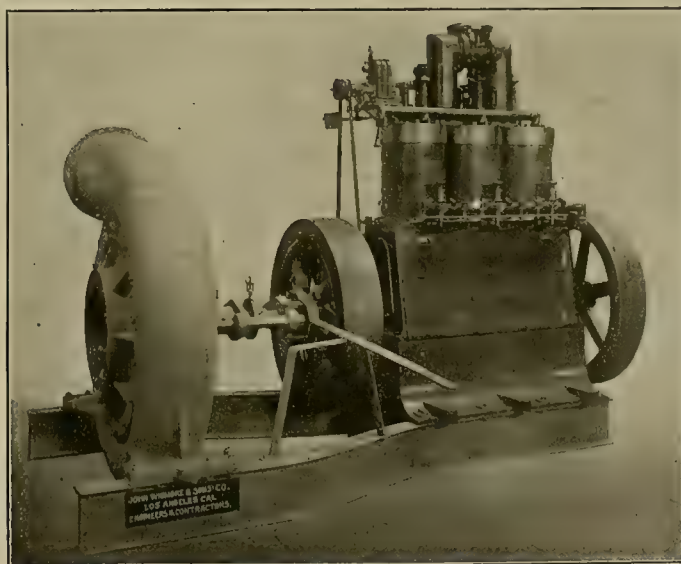
A Modern Submarine Drill Boat. (See page 78.)

cut in two and half saved. The figuring of saving may be correct, but the mine operator having made it is not permitted to take it. The transportation service takes it by the simple expedient of making the freight charge for pure copper twice what it is for copper matte containing only 50% of copper. It

least cannot build all the transportation facilities they need. They can, however, get the data of freight charges they are paying. They can get the data of the flat cost of the service they are paying for. With this knowledge, they have in their possession the same tools with which the coal and iron



Front View of Engine and Pump.



Rear View of Engine and Pump.

freight charges are made shows the difficulty involved in making the determination. It resides not in the making of the economies which will reduce the quantity of service required, but in the retention of the money saving that the reduction of the quantity to service should bring. To illustrate this, copper matte containing 50% of copper and 50% of sulphur pays a

may be, and often is the fact, that the copper matte, owing to its gold and silver content, is worth more per unit of weight than pure copper; but that is not permitted in this case to affect the charge.

Illustrations can be multiplied indefinitely. The simple statement of one shows the economic absurdity which custom has made a commercial law of

miners and workers made their freight cost economies. The failure to have this knowledge has made futile the efforts of the petroleum producers of California to reduce their freight costs of production.

There is a distinction that should be observed. It is knowledge of the facts in units of the engineer's measuring stick—dollars—that is of first importance.

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STATE MINERALOGIST AUBURY of California is initiating an experiment that it is to be hoped will prove such a practical success that it will be continued as incidental to the operation of the State Mining Bureau. He is offering the service of the Bureau without charge to experienced mining laborers out of employment and to mine operators in need of such workmen. While not strictly an employment office, the service given will effect the same purpose. It is difficult to see where the innovation will in any way detract from the object sought in the establishment of the Bureau. On the other hand it will certainly tend to bring the work, and accumulated technical data of the State's mining industry, close to all the men who are connected with the mining industry. Its ultimate influence on the relation between the mine operators and employes would seem beneficial rather than otherwise. As an attempt to make a public office directly useful, and to bring it in closer touch with industry, it is to be commended and endorsed.

THE rage for big things in mines is probably responsible for the much misused and hard-worked expression "group of mines." As commonly said, it seldom means what the words say. What the users of the phrase really mean would be more exactly said by the phrase "group of mining claims," and would be more simply said by the use of the single word "mine." Single mining claims or single mines seem to be considered too small to be mentioned in this age of big things. Nevertheless the mine may be, and really most often is, a single claim; and if in several claims in common ownership, is yet one mine. The custom is through adding the other claims, to obtain a big extent of surface, that to uncritical thinking will seem the same as if more and bigger mines. Aside from the sentiment that appeals most successfully from the interest of promoters of prospects, who would sell half a mine as if it really were half a dozen mines, there appears no reason for the misuse of the words. The "Tom Jones group of mines" is really only "Tom Jones mine." Why should it not be so said and so written? The simpler expression, the single word "mine," if used in place of "group of mines," will effect a great economy in paper and ink consumed in the mining business. And the economy should be made. It will tend to put off that evil day when the mining journals, like the smelters and the railroads, shall be forced to combine, if they would continue to live off of what the others who combine first leave of the earth.

Russian Mines for American Capital.

The very latest of alleged mining projects offered as bait for American dollars seems to be an international affair. An indefinitely vast tract of land with mines of gold, platinum and copper is the opportunity, and French and American promoters are to draw the dollars to it, or to them, by fairy tales of fabulous treasures that the Russians are too poor to pick up for themselves.

The description published of the dormant El Dorado is vague and uncertain, as is to be expected with anything possessing the Russian odor. According to these statements, the lands are in the southern Urals, traversed by the Transsiberian Railroad. The mines are undeveloped, though known to be very large and very rich. It is a concession granted by the Czar, so the promoters are reported as saying. Great hydraulic plants and enormous stamp mills and copper furnaces are to be built. The mines have been examined and reported on favorably, it is said, by American mining engineers. By somewhat of a coincidence, Senator Clark is reported as interesting himself and his money in a Russian copper mine. Quite naturally this much advertised project becomes part of the stage play of the other. A country that is good enough for Senator Clark and his millions would be quite good enough for small capitalists who have only hundreds and thousands to invest.

The preceding are of the order of fairy tales. The real business of the proposition is in the statement that it will take \$25,000,000 of capital to carry out the mining plans made for working the concession, and to carry out the similitude of reality to it all, western mining millionaires are reported as stopping in New York on their return from Paris for the purpose of being let in on the \$25,000,000 capitalization.

It is a new stage—rich mines in Russia; but the procession of brass bands and the stage properties are the same that have done service in every mining bunkoing of investors for the last quarter of a century.

Very, very little of the statement made is true. Much of it is untrue. All of it is intended to be suggestively false and intended to assist in making possible investors deceive themselves. The real facts of the particular country in which investment is asked are very different. The Transsiberian Railway in the Urals does not traverse the gold-bearing region of the Urals. There are few placer deposits in the region it does traverse. They are very poor in gold and will not pay to hydraulic. There are no platinum deposits in that section. There are no copper mines. There are a few small gold-bearing quartz ledges, and one small mill has been built and operated. The ore has been low grade and the ledges are small. The Czar has what is called in Russia the Cabinet—a body of officials corresponding to the steward of an English estate. The Cabinet may have given a mining option on some of the private estates of the Czar. If it did, it has engaged to receive 20% royalty on the gross production. The Russian laws do not admit American mining companies to operate in Russia. French companies can operate, but two-fifths of the stock must be owned in Russia and a majority of the directors must be Russians. The manager must be a Russian.

The statement made that American mining engineers have reported favorably on the proposition for American capital is probably untrue. It is doubtful if any Russian mining proposition has ever been approved by American engineers for foreign investment. No foreign mining operation has ever been commercially successful in Russia. Considering the conditions, the Russians' governmental and commercial policy with foreign mining capital, it is not surprising. What is surprising is that American investors should be expected to take mining bait that has been disgorged by French, German and English investors.

While Russia has all the vague unsatisfied interest that remoteness and lack of knowledge of it can give, it really is not necessary, if one only wants the experience of losing money in alleged mining, to make the loss to the Russians. It can be done right at home in the United States, where there is always the chance of getting it back in Wall street.

Brain Labor-Saving Devices.

On another page of this number appears a graphic table, for which our readers are indebted to D. E. Bigelow. It cost him considerable time and labor. Its publication will enable the many who will make use of it to save an aggregate of time and labor in proportion to which the time and labor Mr. Bigelow gave to prepare it will become a negligible fraction.

Engineers who have to handle the flow of water in pipes will appreciate the table. It is more generally and readily useful than a table of figures would be. Aside from the special value of the work, it should be suggestive to the reader of this journal. There is nothing so immediately useful to mining, and the engineering arts that are part of its practice, as devices that save brain labor. Very broadly, anything is a device that saves brain labor that is new to the originator of it. Graphic tables that give to the eye the results of many calculations from complicated formula are only one class of devices. Plans and descriptions of special forms of structural work in timber or metal, made to meet the requirements of conditions outside of the usual, are another class of brain labor-saving devices. Many of these forms of structure are regarded by the originators as of little importance. This, however, is a mistake. Because simple and common to them, it is not necessarily so to others. The plans and descriptions of special forms of machinery developed from use, and describing details of practice in the vast field of metallurgy, constitute another great class of brain labor-saving devices.

Each one of the vast mass of the newly originated devices represents the expenditure of brain energy. That the indefinite multiplication of this brain energy expended may be avoided is the object of publicity for what the one expenditure has already done. Knowledge is so vast an aggregate now that he who would get much of it must take it wholesale. It must be obtained and assimilated as conclusions without the scaffolding of mental construction for each new idea. Wherever possible the engineer to-day takes the result of successful work where he finds it, and applies it for his own, thankful for the saving in brain time and brain labor which the work of another has enabled him to make.

This journal, itself a brain labor-saving device for its readers, invites, as it has frequently done in past years, its readers to send to it the new ideas that their practice of the engineering arts and mining is constantly originating. In their publication each who gives will gain more than he gives. Graphic tables from formula in constant use, tables of figured engineering data, including construction costs, tests of efficiency of water wheels, drawings of constructions, details about mine and mill practice, are all exceedingly desirable and exceedingly valuable as brain labor saving.

THE ownership by the Amalgamated Copper Co. of the stocks of the Anaconda, Boston & Montana, Butte & Boston, Parrott and many other producing companies is resulting in a declaration of dividend payment of the same earning twice. This is not taken into account by the copper stock boomers, who thus overstate the dividends earned by copper to magnify unduly the importance of the industry relative to gold and silver mining. Another element that should be taken into account in the comparison is neglected, though not at all negligible. This is the production of gold and silver made by the copper mines. In current publication the profit of this production which contributes to dividends is never stated. Copper is given the credit of the dividends. As a fact, an analysis of the production of the copper mines producing gold and silver as well, and an apportionment of the cost charges between the three, will show that at least a third of the dividends credited to copper should be credited to gold and silver. If, then, there be deducted from the total of the declared dividends of copper mining companies, the Amalgamated Copper Co. dividends, and the proportion of the total that should be credited to gold and silver, the remaining dividend total paid from copper earning, while it will lead the gold and silver mining net profits for 1900, the lead will not be startling, either in aggregate or in percentage of the total profit earning of the metal mines.

Concentrates.

THE batter of the side posts in trestle bents is made about one horizontal to eight vertical.

THE seasoned wood of the blue gum (eucalyptus) has been discovered to make excellent insulating pins for electrical work.

AN average rate of driving an oil or artesian well downward to a depth of about 1000 feet, including the casing with 6-inch drive pipe, would be 30 feet daily.

THE best and latest treatise on stamp mill practice appeared in full in this paper in the issue of Dec. 1, 1900—five pages, illustrated.

IT has been estimated that with gas pipes buried but a short distance beneath the surface and exposed to a wide range of temperature the average leakage per annum per mile of 6-inch pipe is 250 M. cubic feet.

THE proportion of silver to gold in an assay bead to be parted should be as near as possible as 2½ is to 1. If necessary, add the deficiency in a weighed quantity of pure silver foil and fuse or cupel into the bead before starting to part.

INFUSORIAL EARTH is a porous, siliceous earth indurated. It is formed from the siliceous shells of diatoms and other microscopic animals, and occurs in beds that are sometimes of enormous extent. There are deposits in California and Nevada.

PUMICE is the name of the spongellike or cellular parts of lava. Its structure is believed to be due to steam or gas in the lava at the surface at the moment solidification started. The floating of pumice is due to the cellular structure, the cells containing air.

IN setting the tip of a water supply pipe to a tangential wheel, it should be so placed that the line of the jet is tangent to the wheel and the tip should be set as close as possible to the wheel without being in contact with the buckets, one-quarter inch being ample clearance.

IN sharpening drills for drilling rock the corners should be hammered thin and gradually increasing in thickness from corners to the center. If the center of bit is too thin in proportion to corners, the center cuts so fast as to cause too much strain on corners, resulting in chipping of corners or breaking of bit.

THE splash of the water from the buckets of a tangential water wheel has a velocity equal to one-half of the velocity of the jet as it impinged on the buckets. Under high heads this residual velocity even in spray represents considerable power. The shape of the bucket is, on this account, particularly important with very high heads.

EXPERIMENTS made in connection with the stone materials used in making concrete have shown limestone screenings losing 20% of fine dusty matter under washing. Tests made show that after twenty-one days the strength of briquettes made with washed ¾-inch screenings was 55% higher than that of briquettes made with the unwashed screenings.

THE work done by water from a pressure head of gravity would be done by the same water under the same pressure regardless of the source of the pressure. If a hydraulic elevator will work under a gravity pressure from 300 feet head the same machine will work with the same quantity of water delivered to it from a pump under a pressure of 130.2 pounds to the square inch.

IT would seem preferable, where practicable, to put water power into use directly by direct connecting a water wheel with each machine requiring power rather than to develop the power in one unit and transmit it to individual motors for each machine. The use of the water direct is a saving of power, and therefore of water. The plant cost is somewhat less using the individual water wheels.

WITH electric power employed in a mine and mill, many of the operations of which are intermittent uses, in order to equalize the consumption of power, it is desirable to use a motor to compress air into a relatively large air storage capacity. The compressed air would then be used for air-power drills and hoisting. The electric power would be used direct in the mill and for pumping in the mine.

THE slip in slip-jointed sheet-metal pipe should not be less than 4 inches nor more than 6 inches. To slip two joints together, wrap a piece of gunny sack saturated with kerosene around the end of the joint slipping outside and set it on fire. The heat will fire the coating outside, expand the metal and melt the coating inside, so that the other pipe end can be started in and driven by a block and maul from the other end.

THE notice posted on a claim that an owner or the owners will not be responsible for payment for work done under a lease, bond or contract, protects the interests of the owners against liens from the date of posting. It would seem also that it would protect against liability for liens created before the date of posting provided the holder of the claim does not within thirty days from the posting make demand of the owners for the claim and make the lien. Delaying more than thirty days would seem to bar the lien attaching.

FOR concrete any good hard stone may be used, granite, trap or limestone being most common, and sandstone being generally forbidden. The stone must be clean, and it is sometimes required to be screened free from stone dust, which reduces the strength. The size is

generally limited to 1½ or 2 inches in the maximum dimension, while a ¾-inch granite is preferable for bridge seats, pedestal blocks, etc. Gravel is sometimes used in concrete, either alone or as forming not more than 50% of the specified amount of stone.

THIRTY TONS of dynamite exploded in one blast, but in many separate charges, through two acres of Arch rock, an obstruction to navigation in San Francisco harbor, produced comparatively little earth-shaking effect at a distance. This was probably due to the distribution in many charges. The interference of the small earth waves coming simultaneously from many adjacent points dissipated instead of cumulating their effect. The blast was successful in removing the obstruction.

SEVERAL new discoveries of corundum in quantity have been made recently in Ontario, Canada, where the corundum occurs in a syenite, and in North Carolina and Georgia in a gneiss or a quartz schist. Except in Montana, the corundum localities in the United States are limited to the Appalachian region, and its mining has been confined to northeastern Georgia and southwestern North Carolina, except for the emery mines at Chester, Mass. Its great value as an abrasive lies in the fact that next to the diamond it is the hardest mineral known.

PROXIMATE areas of irregular boundaries can be obtained from a plat without the use of a planimeter if an assay balance sensitive to a tenth of a milligram is available, by the following method: Take thin tracing paper and with the scale of the plat line off a square or other convenient shape containing any convenient number of square units; 100 is usually convenient. Cut the square to the lines and weigh the pieces on the balance and determine the weight of one square unit. Line out, by tracing on a sheet of the same paper, the irregular area to be computed, cut to the lines, and weigh. A division of this weight by the unit area weight will give a proximate area.

THE Supreme Court of California has reversed in the Tuolumne county case of J. M. Burns vs. the owners of the Mt. Lily mine the finding of the trial court. The facts were that Burns, who was employed by the defendants grading a millsite on public land which was not claimed as a mine, discovered a pocket containing \$25,000 gold, which the owners of the Mt. Lily mine took possession of. Burns brought suit to recover the value of the gold. The trial court decided that the gold belonged to Burns' employers. The Supreme Court has reversed this decision and decided that the gold that an employee finds on public land belongs to him as discoverer and not to the employer.

THE General Land Office of the United States has always held that it was necessary to show a discovery of valuable mineral on a mining claim before it could be patented. In the oil land contests, so called, between scrippers and locators the decisions of the Commissioner and the Secretary were that the locators had a grant right of occupancy of the land that prevented lieu scrip from attaching. The decisions did not make the locations patentable without a discovery. The Land Department recognized physical conditions in its decision and refused to take away from a locator acting in good faith his right to discover the petroleum by the expenditure of his labor. But there was nothing in the decision which would permit a mere locator without discovery of the petroleum to patent the ground.

THE new California Code makes it the duty of supervisors on application of parties interested to cancel the assessments and delinquent taxes on all possessory rights which under instruction of the State Board of Equalization have been heretofore assessed and taxed. The provision is made retroactive. It affords a method of clearing up the titles to many mining claim locations. Under the laws in force before the new provision came into effect if taxes became delinquent on mining claims, even if they were abandoned, they were sold to the State. The State, however, could acquire no title to public land of the United States by virtue of a purchase at sale for delinquent taxes, and the only effect was to cloud titles, which can now be simply and inexpensively cleared.

USE a mining transit for underground surveying in preference to a compass, but be prepared to make a mine survey with any tools you have or with no tools at all. There are many mine openings in which it is impracticable to set up a transit. Under such limitations make the survey by the measurement of lines, using fine wire stretched taut between points to measure on and from. Using plumb bobs and a straight edge with a spirit level, vertical angles can be measured by measuring the three sides of the triangle made by the line of the survey, the plumb line and the base from the plumb to the foot of the survey line. Angles between survey lines can be calculated from three-side measurements of triangles, two sides of which are the survey lines or the measured portions of them.

LIGHT galvanized sheet iron, No. 26 gauge, will do for 4-inch water pipe where there is no water pressure on the pipe. It is rather too light metal to be durable. No. 22 gauge metal would be better. With No. 18 gauge metal 4-inch pipe under the conditions of no water pressure is made unnecessarily strong. Black sheet iron pipe made of No. 22 gauge, dipped, will answer as well as the galvanized. The dip preferable is composed of pure asphaltum and refined maltha. Coal tar is used as a substitute for the latter. The prepared dip can be obtained in barrels. The quantity required per foot of 4-inch pipe would be about three-quarters of a pound to a

pound. For dipping 4-inch pipe, a vessel made of sheet iron, about 30 feet long, should be made; in form, a half circle of 8-inch radius, closed at the ends. A temporary furnace can be built under one end and a flue run under it to a draft stack at the other end. The dip should be heated to between 300° and 400° F., and the section of pipe should remain in it till brought to the same temperature.

MORE important than recording a notice of location is making the location. Making the location comprises: (1) finding valuable mineral; (2) marking on the ground the boundaries of the location of the discovery; (3) posting a written notice of location with the names of the locator, the date, and a description of the claim that describes it so it can be found and identified on the ground; and (4) entering into possession and continuing that possession by every year doing the annual assessment work. Doing these things the ground is not open to relocation. Failure to record a location does not create a forfeiture. A claim may be void from the beginning because of an improper location, not properly marking boundaries or posting notice. It is only forfeit by failure to do assessment work. A legal location held twenty-five years in conformity with law cannot be forfeited because the locators failed to record the notice.

SEVERAL varieties of clays can be used for making vitrified brick, but they are not all equally desirable. Surface clays of glacial origin, semi-refractory clays and non-refractory shales can be employed. The latter are preferred, being usually fine-grained, and containing a sufficient quantity of fusible impurities to bring about vitrification at the proper temperature. An average shale analysis would be silica 56%; alumina 22.5%; ferric oxide 6.7%; lime 1.2%; magnesia 1.4%; alkalies 3.70%; and loss in ignition 7%. There is considerable range of variation in composition allowable. The shale, when ground and mixed, should be quite plastic and should possess good tensile strength. It should burn to a dense product and the points of incipient fusion and viscosity should be at least 250° F., and preferably 400° F. apart. In drying or burning, it should not shrink excessively; between 9% and 12% is about right for the maximum.

THE Hunt & Douglas copper recovery process consists in treating the roasted ores with a solution of ferrous chloride, cuprous chloride being formed and going into solution. The solution is passed over native copper and changed into cupric chloride, and finally over scrap iron which precipitates the copper and regenerates the original ferrous chloride. The copper in the ore must be roasted and fully converted into oxide, which is on a commercial scale a difficult operation. Either too much heat in roasting or too little results in loss of copper through failure to make it soluble, or by loss of iron by having it in the form of sulphate. The advantage of the method is in the small amount of iron required to precipitate the copper compared with the sulphate processes. Theoretically, the consumption of iron per ton of copper produced should be 968 pounds, as compared with about 3600. Practically it is found to require about 1500 pounds.

THE cost of production of copper at Lake Superior mines depends on the percentage of copper recoverable from the rock. The silver it contains just about pays the cost of the electrolytic refining which recovers it. The flat cost of mining and reducing a ton of copper-bearing rock will average close to \$2.50; exceptionally it has been brought down to \$1.90. With the average cost \$2.50 a ton, a yield of copper of 1%, or 20 pounds, would cost 12½ cents a pound, to which must be added 2 cents for freight, refining and selling, making the total cost 14½ cents per pound. Two per cent ore, yielding 40 pounds of copper to the ton, would cost 6½ cents a pound, plus 2 cents, 8½ cents a pound. If costs to the ton of ore are \$2.50, with copper selling in the market at 17 cents a pound, ore that yields 16½ pounds of copper to the ton—0.83%—will just pay costs. If costs to the ton of ore are \$1.90, with copper selling at 17 cents, ore that yields 12½ pounds of copper to the ton—0.63%—will just pay costs.

A DEVICE which will facilitate the collection of the figured data from which to calculate the actual rock in place removed in making a tunnel construction is made as follows: Such tunnels have rail tracks in them and advantage is taken of this. On a car truck is set up a vertical shield, say 16 inches wide and extending from a foot or so above the middle height of the tunnel. The shield should be at the extreme front end of the truck and set vertical and fast in place. Fasten a paper protractor, with degrees reading from 0 to 360, on the front side of the shield, with the zero point vertically below the center. The center of the protractor should be about middle height of the tunnel. At the center set a pivot pin, with a flat sleeve head, through which a flat graduated measuring stick slides. The length should be such that it will remain in the slide and reach extreme points in the tunnel cut. To use the device, slide out and in the measuring stick at any desired point till any angle point in the tunnel is touched. Read the degrees of the angle with the vertical from the position of the measuring stick on the paper protractor. Read the distance from the center of the angle point in the tunnel section on the measuring stick. Record the angles and distances. From this record the cross section can be plotted and its area determined. With the distances between two successive cross sections known, the cubic space from which rock is removed is determinable with a high degree of exactness.

Loss of Pressure by Friction of Water in Pipes.

Written for the MINING AND SCIENTIFIC PRESS by D. E. BIGELOW.

Part of the practice of every engineer having the planning of water pipe service lines is the calculation of pipe capacities, velocities of flow of water, sizes of pipes, and losses of pressure. It is purely mechanical work, requiring many repetitions and consuming much time. While the results of such calculations are indispensable, the getting of the results by mathematical calculation every time it is necessary to make pipe estimates has seemed wasteful of valuable brain energy. Desiring to save some of this waste, I have prepared a graphic table by calculation from the accepted formula for pipe water flow. With this graphic table the mechanical labor of calculation is eliminated entirely for pipe estimates within its figured outside limits of pipe diameter and velocity of flow.

In illustrating the use of the graphic table here-

plant consists of a horizontal compound condensing engine driving a 130-kilowatt generator. The pumps, of the three-throw mining type, with plungers 11 inches in diameter by 18 inches stroke, deliver 500 gallons per minute against a head of 600 feet. Three men can take care of the plant, which runs for only eight hours per day out of the twenty-four, and the coal consumption has been reduced to two and one-third tons per day. The total working cost now amounts approximately to \$2400 a year.

Gold Mines in Korea.

A concession covering a gold mining district has been granted by the Korean Government to a French subject, P. M. Saltarel. It is similar to those already granted to Americans, Russians, Germans, British and Japanese. It is for a period of twenty-five years from the date of commencement of operations, which must be made within two years. A royalty of 25% net will be paid to the Korean Government after the expense of development has been recovered. No im-

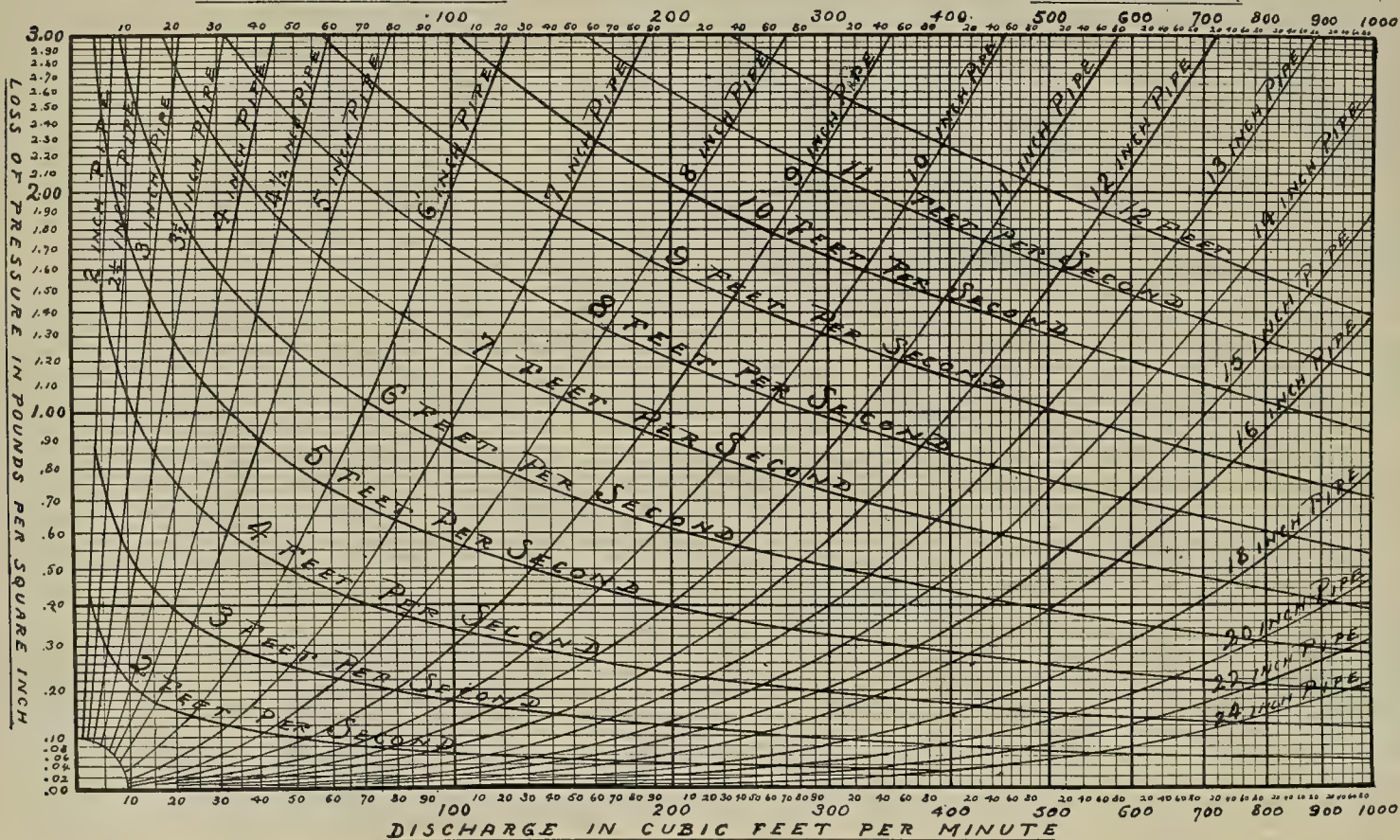
A Modern Pumping Plant for Leaching of Alkaline Lands.

The gasoline pumping plant illustrated is on the front page is of the direct-connected type, with a vertical three-cylinder engine, arranged to use either gasoline or distillate as fuel, and driving a centrifugal pump through a friction clutch on the crankshaft, the friction clutch being considered essential, as it admits of starting the engine without the load, which can be thrown in without undue strain.

The engine is provided with a governor of a simple type, which acts direct on the amount of fuel supplied to the cylinders, thus designed to insure economy in operation, with the simplest mechanism. The speed of this engine is 300 revolutions per minute; running at this rate, it would deliver over 8000 gallons per minute. The engine is rated at 50 H. P.; under a brake test, the manufacturers say it delivered over 73 H. P.

The purpose for which this plant is used is unusual,

FRICITION LOSS
IN PRESSURE OF WATER FLOWING THROUGH 100 FEET OF PIPE OF VARIOUS SIZES
AT DIFFERENT VELOCITIES IN FEET PER SECOND GIVING DISCHARGE IN CUBIC FEET PER MINUTE
FROM WEISBACH'S FORMULA
BY D. E. BIGELOW.



with presented, suppose it is required to pipe 100 cubic feet of water per minute at a velocity of flow not to exceed 4 feet per second. Wanted to know the size of the pipe required and the loss of pressure in each 100 feet of pipe.

Read up on the vertical line denoting 100 cubic feet per minute to the curved line representing 4 feet per second. Just below the intersection the line denoting 9-inch pipe crosses the 100-foot line, showing that 9-inch pipe will be required. The horizontal line intersecting at this point is .30, showing there will be a loss of .30 pound per square inch in pressure for each 100 feet of pipe.

Of the four denominations represented in the table—velocity, quantity, size of pipe, and loss of pressure—any two being given, the other two may be determined in the same manner.

An Electric Pumping Plant in Scotland.

An elaborate electric pumping plant has lately been introduced in a Scotch coal mine and the figures representing comparative costs of the new system and system pumping are very interesting. In the original pumps, working against a head of 581 feet, there were three lifts, a duplex pump working 160 feet, another duplex pump working 311 feet and a bucket pump working 110 feet. These required seven men for attendance in working and consumed fourteen tons of coal per day of twenty-four hours. The plant ran seven days a week and the annual total cost of pumping, without allowing for maintenance, etc., was approximately \$20,000. The new

port tax on necessary materials will be levied, and the products of the mine will be exported free of duty. Other minerals besides gold may be mined within the district. The district has not yet been located, but it cannot include any of the forty-three districts reserved for the Crown and known as the Household mines. The district must not exceed in extent 40x60 li (13½ to 20 miles).

Gold mining in Korea has been successfully prosecuted by the Oriental Con. M. Co., an American organization, which operates the Woosan mines. This company has a district some 25 by 30 miles in extent. The company disposed of the 25% royalty by paying a large sum in cash and agreeing to pay a fixed annual amount. It is now successfully operating two mills of twenty stamps each and one of forty stamps, while another 40-stamp mill is in process of erection. The company have a cyanide plant as well. The operations at present are confined to quartz, but placer deposits will soon be worked. Some seventy foreigners are employed at these mines, with over 3000 natives. The natives are said to be satisfactory as miners, and they are content on a wage of 20 cents gold per day.

The British mines are at present next in importance to the American mines. They lie not very far from the district occupied by the Americans. Much money is being expended in exploitation, but they are too new to be out of the development period.

The Germans are actively engaged in working their district, which lies to the east of Seoul. The Japanese are opening up their mining district to the south of the city. The Russians seem not to have begun work upon their mining concessions as yet.

and a striking evidence of the importance of scientific methods in dealing with the problems arising in large farming operations, particularly where marsh or alkaline lands are to be reclaimed. In the present instance what is contemplated is a huge leaching operation, by which the injurious alkaline salts are leached out by the rains, carried through an extensive and scientific system of tile drains to the pumping plant, raised about 12 feet, and flumed across the low sand hills to the ocean. Thousands of acres of land are underlaid by this system of tile drains, and the natural waters, distributed over the surface in the form of rain, percolate through the alkaline land, taking up the salts in solution, and being finally delivered to the pump.

The enormous amount of alkaline salts that may be removed by this process may be appreciated when it is considered that the capacity of the pump is stated to be over 8000 gallons per minute, and the amount of alkaline salts in the water is sometimes over 6%.

This pumping plant was furnished by John Wigmore & Sons Co. of Los Angeles, Cal., to the Patterson Ranch Co. at Oxnard, Cal., for use in connection with the drainage system of their extensive sugar beet, lima bean and other lands in that neighborhood, and is reported to have been in successful operation for some time. The entire installation is one of unusual compactness, and considered peculiarly suited to the requirements of the case, as the duty at some seasons may be intermittent.

The success of this installation may lead to others for the same purpose, as the importance of this method for removing the objectionable salts from alkaline lands gives promise of success.

The West Gore Antimony Deposits, Nova Scotia.*

From 1840 (the year of discovery) to 1892 the mine was worked with varying success and under a number of various managements until 1899, when it was closed down, and remained so until the present owner, Alex. McNeil, bought the property about two years ago, and since then considerable prospecting work has been done. About 1100 feet from the McDougal discovery, in a southwesterly direction, another vein of this same ore was found by Gould Northup in 1887. The north and south veins, as they have been called, each have the same course, dip and general characteristics; but, as it was from the north vein that the large proportion of ore was obtained, the writer will confine himself almost entirely to it in this description.

The north vein is a true fissure vein; it has a course N. 45° W. and a dip to the S.W. averaging 85° from the horizontal, and has been traced upon the surface for over 1200 feet. The jumbled up slate, calcite and quartz which constitute the vein filling is cut by numbers of small quartz stringers from the foot wall side. This foot wall is irregular and indistinct, but the hanging wall is always clear cut and smooth. The country rock is made up of gray slates and quartzite, which have a strike almost east and west, and a dip of 45° from the horizontal, towards the south, and no faulting has occurred since the vein was formed.

The ore, as a rule, clings closely to the hanging wall, but in one or two places it splits in two and one part follows the hanging wall and the other the foot wall, while at times it will break entirely away from either and follow the center of the vein.

The ore is stibnite, solid sometimes, and then again is mixed with quartz. Where the stibnite has been exposed it has oxidized into the orange-colored kermesite and the white valentinite; but these oxides are in very small quantity and only as a thin coating over the solid ore. Sometimes the stibnite is replaced by iron pyrites, arsenical iron pyrites and galena. More or less gold is always found in the ore, and seems as a rule to be richest in that metal when the percentage of stibnite is high. With the excep-

tion of where a cross vein of quartz comes into the vein at No. 1 shaft, none of the gold is free, even in ore assaying as high as ten ounces gold to the ton. The width of the vein has varied in size from a few inches to 7 feet, and in its widest place has been solid stibnite. The ore chute has an average dip of 45° to the southeast.

From the section plan, it will be seen that a number of shafts have been sunk on the vein, but the one now called No. 3 was the first deep shaft put down (the outcrop was a little to the west of this), and reached to a depth of 170 feet. No. 2 shaft, 220 feet to the eastward, was sunk to a depth of 170 feet, but has since been extended another 70 feet. No. 1 shaft, vertical for 240 feet, with its crosscut to the vein and crooked winze shaft of 188 feet, was the last sunk and is situated 156 feet east of No. 2 shaft; besides these, four shafts from 20 feet to 40 feet deep have been sunk on the vein east of No. 1, and two more west of No. 3 shaft; in these, except in No. 4 shaft, the ore was very low grade, but they demonstrate the great extent and continuity of the vein.

The amount of ground stoped is estimated roughly at 76,000 square feet of the vein, and this no doubt is the outside limit, for no account is taken of a little low-grade ore which is left in the stopes as pillars and in other places, for the writer is informed that only ore carrying 50% of antimony and over was marketable. Of course, some of the second class ore was sorted up to the standard. From the above amount of ground stoped there has been shipped, according to the export returns of the Customs Department, 3121 tons, and since the present owner secured the property they have shipped 1236 tons of second class ore from the dump—550 tons of this were sold to the Antimony Gold & Complex Ores Ex. Co., and gave 12% antimony and 18 dwt. in gold—686 tons were bought by the St. Helen's Metal Recovery Co., and gave 11.83% of antimony.

From the many assays made of the high-grade ore, it is safe to say that 3000 tons shipped previous to 1892 averaged between two and three ounces of gold per ton. For a long time it was not known that the ore contained any gold, and when it was discovered the smelters refused to give any value for it. The greater demand for antimony ore has increased the price, and the improved metallurgical processes have not only made possible the utilization of a much lower-grade ore, but have enabled the smelters to pay for a considerable proportion of the gold.

The St. Helen's Metal Recovery Co., after putting up a trial plant and proving it successful, are erecting works to treat 600 tons a month, and will not only buy ore as low as 12% antimony at regular market prices, but expect to be able to pay 75% of the gold contents. There are several thousand tons of this second-class ore in the mine to-day not stoped, besides larger quantities are said to be lying in the chutes, which, at the time operations were carried on, it did not pay to hoist to the surface. An estimate of the second-class ore left in the vein will give it an average thickness of six inches—containing 12% antimony and \$23 in gold to the ton of 2240 pounds.

According to the miners who worked in the mines during the whole period of operations, the ore stoped averaged 1 foot in thickness, and this coincides with the writer's calculations. This stoped ground is the high-grade ore chute, and it is practically worked out down to the bottom of No. 1 shaft.

Samples taken of the slate and soft vein material,

Comparison of Fire with Water for Concentration.

Written for the MINING AND SCIENTIFIC PRESS by S. E. BRKERTON

Since the introduction of large, rectangular furnaces with improved power plants, a more steady ore supply and more attention has been paid to the scientific branch of the metallurgy of copper smelting, the so called "fire process" is driving the wet concentration process to handle only extremely siliceous ores low in values.

The advantages of concentration by the wet process are; getting rid of the silica, which generally requires the addition of lime and iron in the blast furnace when smelted; the production of concentrates containing an excess base; the obtaining of the values originally contained in several tons of ore in one ton; and the saving in freight to the smelter and cost of treatment. To offset these advantages are the losses in copper, silver and gold in the tailings and slimes, losses of copper in solution, and the fact that concentrates are not suitable for smelting until either briquetted or fused in a reverberatory furnace. This last disadvantage is generally more than offset by the iron the concentrates contain in excess of the silica, where silica is in excess in the average ores to be smelted. The losses in concentration vary greatly, depending somewhat on the skill of the mill men in charge, but more often on the character of the ore being treated. The losses are greater when the ore contains the higher grade copper minerals rather than native copper or chalcopryite. When the copper is oxidized, wet concentration is practically out of the question. Very often the character of the ore in the same mine is different in the different ore shoots.

I do not claim to be a practical mill man myself; yet, some twenty years ago, while acting as assayer and chemist in charge of the assay department of the old La Plata smelter at Leadville, Colo., parties would bring me ore to be assayed, and, after learning its value, express their intention of securing a concentrating plant, which I would often try to discourage, especially if the ore contained much of its values in gray copper. In several cases they had their original ideas carried out, mill men were condemned, and changed, one after the other, and finally the mills were shut down, to remain idle or to be removed. At that time—eighteen to twenty-one years ago—copper was not generally appreciated, as now, as a collective agent for gold and silver values; so that if the ore could not be concentrated and was too low in values to stand shipment to a smelter, there was no salvation for the property but to remain idle. Take the same property to-day, and assume that the ore contains:

2% wet copper, @ \$2.50 a unit, equal to 12½c. B. D. \$5 00
10 ounces in silver, less 5% in smelting, net value.. 6 00
1½% of an ounce in gold, value..... 1 00

Total value.....\$12 00

Start with this \$12 a ton gross value, concentrating by fire, say:

10 tons into 1, producing 20 tons of matte,
@ \$120 per ton, produces (smelting 200
tons ore net in 24 hours).....\$2,400 00
Less cost of smelting, @ \$2 per ton.....\$400 00
Cost of marketing 20 tons of matte at
\$15, equals.....300 00 700 00

Leaves a balance of.....\$1,700 00

a day to pay for mining, and profits, as against \$230 by wet concentration, as shown in the following figures:

With wet concentration, 2% copper has generally meant little or no values when concentrated, as it is nearly all lost.

10 ounces of silver, say, 60% saved, value about...\$3 60
1½% of an ounce in gold, say, 80% saved, value about. 80

Total.....\$4 40

Put four tons into one by concentration, and we have \$17.60 gross value in concentrates.

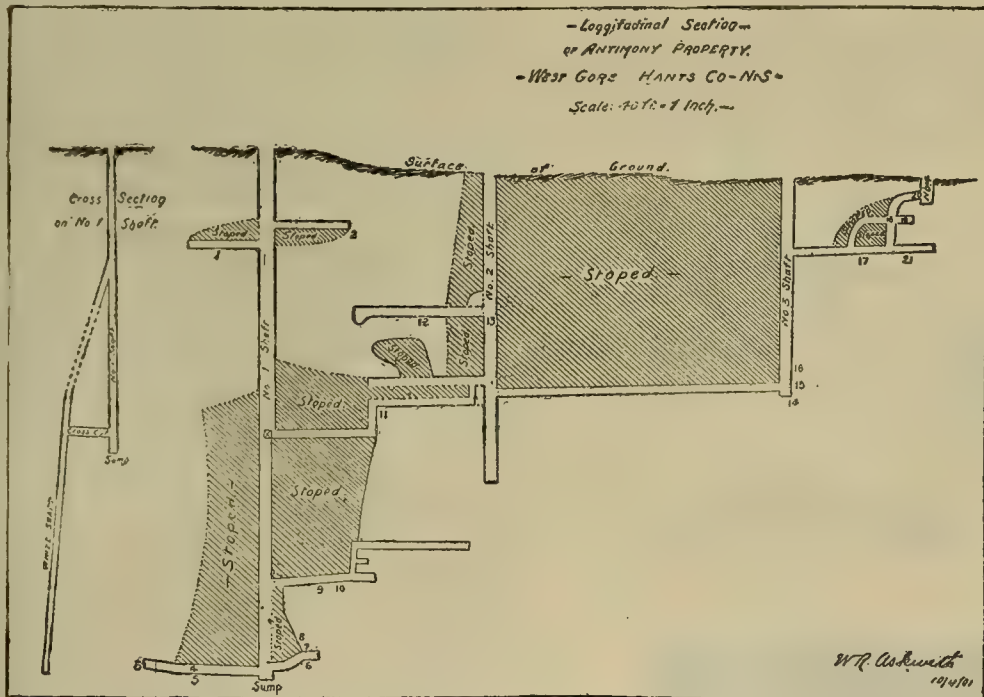
50 tons of concentrates made from a 200-ton plant equals.....\$880 00
Less cost of milling at, say, 75c. per ton...\$150 00
Cost to market 50 tons of concentrates, at about \$10 per ton.....500 00 650 00

Leaves a balance of only.....\$230 00

to pay for mining the 200 tons, and the expected profit.

The same comparison holds good even on a smaller output; but, of course, the cost of smelting would be greater in proportion with a smaller plant, on account of certain fixed charges, and the same increase would hold good to some extent with a concentrating plant. When the ore is very siliceous, say, over 70% silica, if lime and iron is expensive, especially if the ore contains less than 1% copper, then it may be better to concentrate the most siliceous and poorest ore mined in order to produce a concentrate containing an excess of iron to flux the richer and generally less siliceous ore.

This comparison between wet and fire concentra-



care being taken that no ore would get into the sample, assayed as follows:

| Number. | % of Sb. | Gold Values. |
|----------|----------|--------------|
| 3 | 0.20 | \$0 50 |
| 8 | Trace | 2 00 |
| 9 | Trace | 0 50 |
| 11 | 1.76 | 2 80 |
| 17 | 0.15 | Nil |
| 21 | Trace | Trace |

Gold values estimated at 2000 pounds = 1 ton.

Assays of high-grade ore from the south vein gave 60.29% antimony and 2.66 ounces gold per ton of 2000 pounds, and a second-class ore 5.27% antimony and 1.38 ounces gold per ton of 2000 pounds. Five tons of ore assaying 56.96% antimony and five tons assaying 12% antimony were shipped from this vein to the St. Helen's Metal Recovery Co. A shaft has been sunk on the south vein 105 feet.

Another vein of stibnite ore was found by John McDougal a couple of years ago about 700 feet northeast of his original find. There has been found at times rich float ore on a hill situated between the north and south veins, and which it does not seem possible could have come from either of these veins.

* W. R. Askwith, in Canadian Mining Review.

tion is not intended for argentiferous lead ores, especially when the lead contains most of the silver, nor is it intended to apply to a smelting with cold blast, managed with no more metallurgical knowledge than is usually required to manage a wet concentrating plant.

It may be claimed by some critics that smelting cannot be done for \$2 per ton with a 200-ton furnace, and that there will be additional cost of roasting necessary.

In my estimate of the value of copper, I have figured copper at only 12½ cents per pound, allowing the difference between that and the present market quotations, for refining charges, commissions, etc., and it is about the value of copper in matte containing 45% to 50%, which can be made where siliceous ore can be obtained, and a much higher grade matte can be made by resmelting, the cost of resmelting the matte being more than offset by the saving on freight and treatment by the reduced weight of the matte. I have also allowed \$15 per ton on the matte for the freight. Roasting is unnecessary and out of the question for the production of matte when hot blast is used, and a 200-ton plant at \$2 per ton would mean \$400 per day for expenses, to be divided about as follows:

| | |
|-------------------------------------------------|----------|
| Labor..... | \$158 00 |
| Boiler and miscellaneous fuel..... | 42 00 |
| Coke, say..... | 100 00 |
| Lime rock..... | 40 00 |
| Total..... | \$340 00 |
| Add 10% for supplies, lights, repairs, etc..... | 34 00 |
| And for bricklaying and smelting flue dust..... | 26 00 |
| Total..... | \$400 00 |

The above amount does not include insurance, taxes, interest and the salaries of president, manager and superintendent.

This cost can be reduced still more by increasing the tonnage, as the fixed charges, such as office expenses, foremen, engineers and carpenters, would remain the same. On the other hand, the fixed charges would remain nearly the same, even if only 100 tons of ore per day were being smelted, which would make the cost of smelting with a small-capacity smelting plant proportionately greater on that account.

The Scooby Tailings Sampler.

The accompanying illustrations show a new form of a tailings sampling machine that has been in operation in one of the Denver ore-testing plants for some six months. The machine under trial is reported to have given very satisfactory results, and it is now

intermediate proportionment may be taken, as desired, by regulating the arc of travel of the bucket and the number of strokes per minute. In the average 100-ton stamp mill the flow of crushed ore and water will amount to about 300 gallons per minute, or 150,000 gallons per eight-hour shift. The Scooby sampler, adjusted to take a sample every five minutes, will gather about fifteen gallons of wet sample or about one gallon of dried sample in this time. The accuracy of the machine on these small samples is considered very good, as the cut is taken across the entire stream at practically uniform speed and at regular intervals. It has been recognized that the ordinary system of taking tailings samples in mills is not wholly satisfactory, dependent as it is on the attention of the mill man as to detail. The only correct method of sampling tailings is the same as is used on the heading for concentrates, namely, taking samples at regular time intervals, and cutting entirely across the stream, as is done by the above illustrated machine.

The Scooby sampler cuts through the entire stream, but so quickly that only a small proportion is diverted. This feature is obtained in the Scooby sampler by a small mechanism that passes the bucket through the entire stream of pulp in about one-half second of time, and locks the bucket arm in position entirely out of the stream until time for the return stroke. The bucket is held outside of the stroke in periods that may be varied from one to five minutes, when it is automatically unlocked and returned through the stream. The bucket is only supposed to work on the pulp for a small fraction of time. The mechanism is protected by an iron case. It is arranged to be either set upon a separate arm, or to be belted underneath, and attached to the launder itself, in such a manner that the bucket passes by the end of the launder and deflects a small portion of the stream into a sample box. Very little power is required to operate the sampler, and, if a line shaft is not convenient, a small water wheel in the launder itself will furnish sufficient power to drive the machine. The illustrations show the machine as placed for operation on a discharge pipe from a concentrating works, and also a view showing the interior arrangement of the machine.

A Modern Submarine Drill Boat.

The illustration on the front page is of the drill boat G. A. Howells, recently built by H. T. Dunbar & Co. Submarine rock excavation is difficult and expensive work. Experience and close contact with the difficulties involved are essential to success in work of this kind, and this boat in its simplicity of

moving submerged obstructions from navigable waters; also for the obtaining of data relative to the composition of the bottom under water preliminary to engineering constructions, such as bridge piers or tunnel bores, the drill boat is exceedingly useful and efficient. In a recently promoted project to connect England and Ireland with a tunnel under 35 miles of sea bed, a proposition was made by a responsible firm to drill the bottom in the line of the tunnel to depths of 600 feet and through water of equal depth. The illustration used is by courtesy of Compressed Air.

Mines of Northwestern Montana.

[STAFF CORRESPONDENCE.]

Going eastward from Spokane over the Great Northern takes the traveler through a well watered, heavily timbered, mountainous, but not rugged, section of country, extending from Spokane to the Flat-head valley, a distance of 250 miles. The route passes along Pend d'Oreille river for some distance, the latter being the outlet of Pend d'Oreille lake, which is the largest body of water in Montana, and belongs to the Columbia river system. About 100 miles east of Spokane is Bonner's Ferry, on the Kootenai river, which from that point flows northward into Kootenai lake, forming an arm of the Columbia headwaters. A branch railroad line runs from Bonner's Ferry northward, down the Kootenai to Kuskonook, in proximity to the Kootenai silver-lead district. Boats also run between Bonner's Ferry on this stream and Kootenai lake.

Continuing eastward on the Great Northern main line we arrive at Libby, Mont., where Libby creek empties into the Kootenai. This point is of interest because it is the supply and shipping station for the mines in the Cabinet range, which lies to the south some 30 to 40 miles. This range trends from the northwest to the southeast, and is drained by the Pend d'Oreille streams on the south and the Kootenai affluents on the north. The principal streams which flow from this range toward the Kootenai are Libby creek and Fisher river. The basins, gulches and mountain sides drained by Libby creek mark the location of such silver-lead properties as the Snowshoe, Silver Cable and Great Northern, where large expenditures have been made on mills, roads, tramways and underground work. Farther southeastward, in the gulches, basins and hillsides that drain into Fisher river is what is called Fisher district, where the ores are gold-bearing and free milling to a rather marked degree, with sufficient amount of iron and lead sulphides to make concentration of the plate tailings a satisfactory feature. Coarse flakes and particles of gold are visible in much of the white and decomposed quartz that is brought from this district.

Better to illustrate the characteristics of the Fisher district, I give below a few notes on the various groups under development:

The Way Up, on Ibex peak, belongs to Butte parties and is in charge of J. H. Riley, who states that their work aggregates 600 feet of tunnel and cross-cut, and that there are about 4000 tons of ore blocked out, which shows good values in free state and in sulphides. It would run about \$12 per ton. A second tunnel is being driven to cut the lead 150 feet below present workings. The tunnels drift on the ledge.

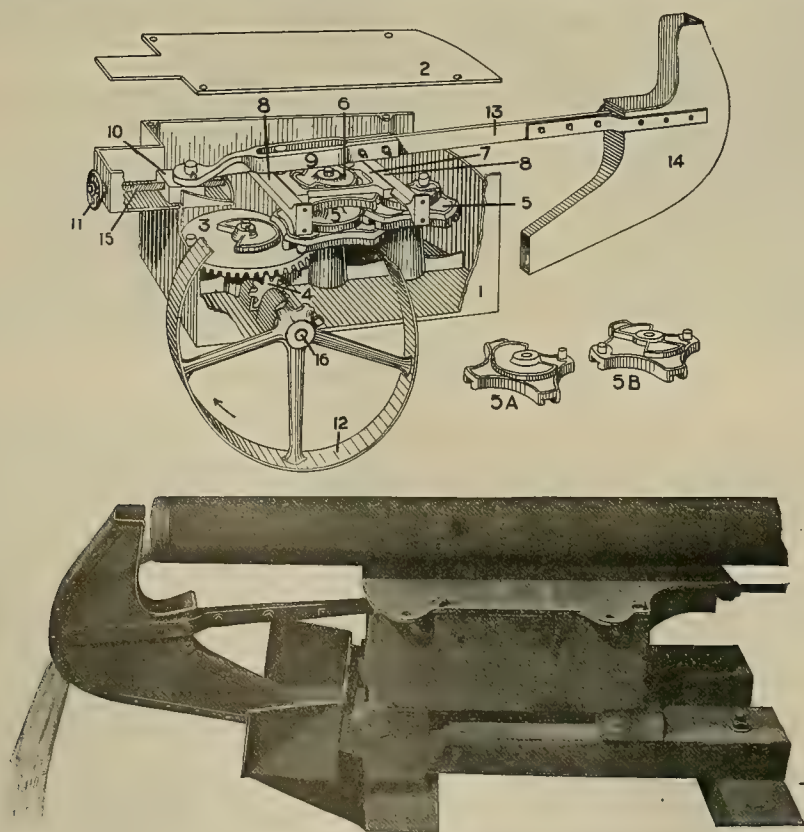
A. B. Johnston has organized a company to develop and equip a group in the same district. A stamp mill is contemplated.

The North Star group of six claims belongs to D. L. McGillis and J. C. Burgoyne, who have about 200 feet of development work done on two parallel ledges that follow the general trend of the mountain range. The ore characteristics disclosed are the same as those of adjacent properties herein described.

The Blacktail group, of which Scott N. Sanford of Kalispell is manager, is owned by a company of Montana and Idaho people. The property embraces nine claims and a water right. The work, which aggregates about 1000 feet along the strike of the veins, discloses a siliceous ore, with a small per cent of sulphide of iron and lead, the principal values being gold. A 10-stamp mill is being erected to save the gold by amalgamation and concentration. It is expected to be operating in a few months.

The American Kootenai group, also in the Fisher district, covers two parallel ledges, 500 feet apart, with over 200 feet of drifting on each one. The veins vary in width from 2 to 4 feet, the ores carrying free gold in hard and decomposed quartz, with a small amount of iron sulphide. A 10-stamp mill, with plates and concentrators, is operating on about twenty-five tons of ore daily. Manager W. J. Beager states that 90% of the saving is effected by amalgamation.

The Mother Lode group, in the same locality, is also under Mr. Beager's management and belongs to virtually the same stockholders, A. Whitworth being president of both companies. A flume is being built so as to utilize 200 pressure of water for power. A tramway 3800 feet long is to be built from the Mother Lode mine to the mill. This property has four parallel ledges that follow the formation, and a fissure that crosscuts it, there being unusually high grade ore



The Scooby Tailings Sampler.

being placed in some concentrating mills by the Mine & Smelter Supply Co. of Denver, Colo., agents for the sale of the machine.

The manufacturers claim as valuable features of the machine: Its ability to gather a very small sample from a large flow of pulp, its compactness and its extreme simplicity. It can be adjusted to take from 100 to 1000 part of the tailings stream, and, if required, may be made to operate from 50 to 2000. This range of adjustment is governed so that any in-

construction, rigidity and in the details, especially of the drill mountings, should be capable of efficient work. This system of drilling is peculiarly applicable to large ledges of rock. Three Rand drills are mounted on light but rigid frames and are capable of drilling holes of from 12 to 15 feet in depth without change of bit. The machines are not fixed to the edge of the scow, but can be moved horizontally as well as vertically.

The use of these drill boats is very largely in re-

at the point of intersection. The walls here, as elsewhere in the district, are both slate. But in many cases the ore shoots follow a dike of porphyry or lime. There is some tunnel and open cut work on the Mother Lode.

The Fisher Creek M. Co. now own the group formerly operated by Brick & Brannegan, who are among the stockholders of the present company. The property is on the same belt as that of American Kootenai. It is opened through two tunnels. A 10-stamp mill, operating on twenty-five tons of ore per day, is being enlarged to twenty stamps. Water power is being put in. The ores run about \$10 per ton.

P. E. Bergstrom & Bro. own a claim on the same belt, on which they have uncovered the ore on two ledges by tunnels, open cuts and stripping. The ore disclosed carries many unusual specimens of free coarse gold in the characteristic quartz of the district.

C. N. Downing owns the Fourth of July group, with water right, whereon there is considerable amount of development, which has resulted in a good showing ore so far as work has gone.

There are other groups in this district, but the above show its general features. There is not much activity among the silver-lead mines near the head of Libby creek.

The Snowshoe is said to be pretty well developed, having good ore bodies with fair values, and that a large tonnage of ore is blocked out. The property includes a concentrator and tramway and belongs to the Pacific Northwest Mining Corporation of London.

The Silver Cable, 6 miles south of the Snowshoe, on the same belt, is also fairly developed and has a concentrating mill and tramway line. It belongs to minor heirs.

The Great Northern group, near the head of Libby creek, belongs to Hildebrand, Allen & Williams of Libby, and has a good showing of silver-lead ore.

On the lower course of Libby creek are some placer operations which are profitable. B. F. Howard has 1000 feet of pipe line, giving 216 feet pressure on two giants that are at work. Mr. Howard has given an option on his group to Butte parties. He says some of his ground ran as high as 75 cents per cubic yard.

Vaughn & Green are also operating on their placer ground on the same creek. Mr. Vaughn showed the writer about \$300 worth of coarse gold, which he said resulted from thirty-five days' work with small facilities.

Wm. Criterman is putting in a flume for hydraulic work on his placer ground on the same creek.

The Thomas group, 6 miles northeast of Libby, is a copper proposition on Rainy creek. It embraces sixteen claims, with development work that is said to show a fair grade of copper ore. The veins are said to be from 3 to 20 feet wide.

C. R. Greeley has three claims on Poorman's creek, near Libby. It is developed by two tunnels that go in on the ledge. He gets an ore that runs well in gold, silver and lead.

It is estimated that 100 men are at work in the Libby district, with the probability that this force may be increased.

At Jennings, a few miles east of Libby, a Great Northern branch line is being built northward, up the Kootenai river, to tap the Crow's Nest coal mines. The main line strikes the open country in Flathead valley, in which the principal town is Kalispell. The main range of the Rocky mountains is crossed between Kalispell and Blackfoot.

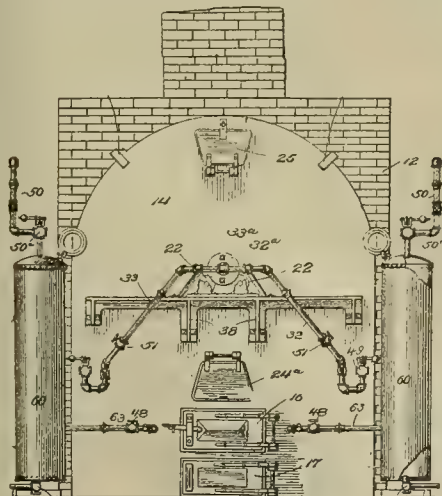
Libby, Mont., Aug. 5.

Mining and Metallurgical Patents.

Patents Issued August 13, 1901.

Specially Prepared for the MINING AND SCIENTIFIC PRESS.

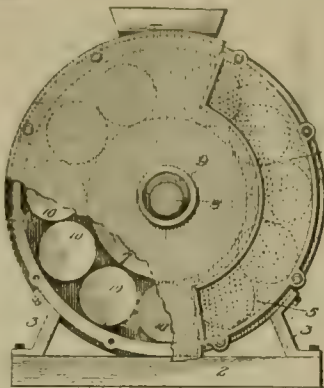
PROCESS OF DESULPHURIZING ORES.—No. 680,313; L. P. Burrows, Washington, D. C.



Process of desulphurizing ores, taking high-pressure steam, permitting a jet of it to expand in a

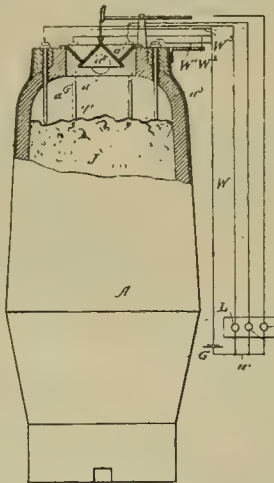
chamber, drawing off condensed water from chamber, passing lower pressure steam drawn from chamber through a pipe subjected to external heat, applying heat to a retort containing a body of sulphide ore and passing resultant gaseous product from pipe through mass of ore.

ORE CRUSHER.—No. 680,401; C. Suttie, Onehunga, New Zealand.



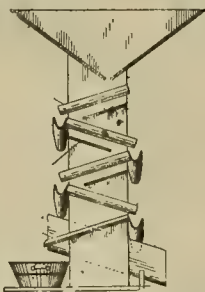
A cylindrical crushing chamber provided with an inlet in its periphery, sieves located in ends of chamber to the side of its axis, a shaft loosely journaled in ends of chamber and having a vertical movement, a drive crusher roll fixed to shaft, and series of rolls loosely mounted within chamber between interior wall and periphery of drive roll, aggregate diameter of rolls being less than circumference of drive roll.

APPARATUS FOR INDICATING THE LEVEL OF CHARGES IN FURNACES.—No. 680,490; T. H. Martin, Cleveland, Ohio.



A furnace, a pair of electric terminals in interior thereof, an electric circuit leading from terminals and including a source of current, and a signal being arranged so that circuit is closed by conductive charge in furnace, bridging from one end of terminals to other.

SAMPLING APPARATUS.—No. 680,526; H. E. T. Haultain, Salmo, Canada.



Two sets of inclined spaced sampling troughs in combination with a mixing board located between sets and adapted to receive material passing between sampling troughs of upper set and discharge it upon lower set near upper ends; a discharge trough located below lower ends of each set of sampling troughs, both discharge troughs adapted to empty at same side of apparatus.

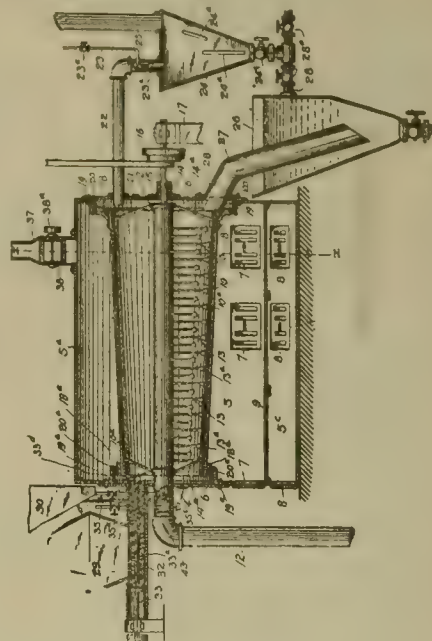
CAP—CRIMPING TOOL.—No. 680,643; H. Cogeen, Goldfield, Colo.



A knife handle provided in its opposite sections with grooves to receive cap and having within blade recess a separate seat plate secured to inner face of one handle section and provided with a notch registering with cap grooves in handle sections, seat plate

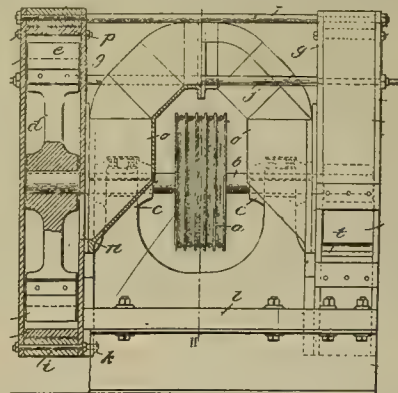
projecting at grooved portion beyond grooves of handle sections and crimping blade secured in handle and arranged to be adjusted in close relation to seat plate and having in edge notch arranged when blade is partially closed to complete with notch in seat plate approximately a circle to fit around cap.

ORE ROASTING AND DESULPHURIZING FURNACE.—No. 680,613; A. S. Partridge, St. Louis, Mo.



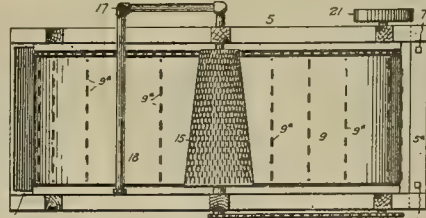
The furnace walls, a revoluble retort, retort-supporting flanges projecting inwardly from walls of furnace, annular wings surrounding retort and positioned within flanges, packing rings between flanges and wings, a discharge pipe leading from wall of furnace at discharge end of retort, and a chute providing a slideaway from discharge end of retort to spout.

CRUSHING OR PULVERIZING MACHINE.—No. 680,650; C. F. Delfos, Pretoria, South African Republic.



Two drums, each consisting of a ring having opening and circular end plates fitted against rings, tie bolts passing through end plates and rings of both drums to thereby rigidly unite them, a second series of bolts passing through end plates and ring of each drum, a plurality of segments in drum bearing against inner surfaces of rings, having undulatory working surfaces, wedges fitted against segments and secured to rings, a shaft extending centrally through plates, radial arms in drums, on ends of shaft, detachable hammer heads secured to arms, a driving member on shaft between drums, a hopper between drums and located over driving member.

CONCENTRATOR.—No. 680,678; G. W. Thornburgh, Denver, Colo.



A suitable frame, and rollers journaled thereon, an endless traveling apron mounted on rollers and provided with broken riffles formed by passing a device, of the construction described, back and forth through apron, its concentrating surface being longitudinally inclined, means for adjusting frame to regulate inclination of apron, a water tank underneath apron, through which latter passes, and in which concentrates are deposited, a stand pipe for supplying water to machine, and two perforated branch pipes leading from and extending above and below the apron.

MINING SUMMARY.

Specially compiled and reported for the
MINING AND SCIENTIFIC PRESS.

ALASKA.

JUNEAU.

It is said the Treadwell mines will, before January 1st next, have 4,000,000 tons of gold-bearing ore blocked out and standing as a reserve.

A 3-foot lead of ore averaging \$100 per ton is reported to have been developed at the Mellen mine, at Berner's Bay. The Mellen is equipped with a 20-stamp mill, air compressor and other machinery.

KETCHIKAN.

C. Jansen, who has been prospecting on Prince of Wales in the interest of G. McKenzie of Ketchikan, has made a discovery near the head of Skowl Arm of two parallel veins or ledges, in the contact between diorite and quartzite, each of them from 12 to 16 feet in width, and separated from each other by about 4 feet of magnetic iron. These ledges can be traced by outcrop for 4500 feet. The ore is pyrrhotite, carrying both copper and nickel, assays of average samples taken from the surface giving values of \$4.50 per ton in nickel, and 4½% copper.

G. Butler, M. Christian and others of Ketchikan have developed some ledges on Coronation island, and have made a trial shipment of sixteen tons, which sampled \$88 per ton in silver and lead. They have now about 400 tons mined and ready for shipment.

It is reported that S. I. Silverman of Spokane has taken an option on a two-thirds interest in the Copper Mountain mine at a very large figure. The mine, including eighteen claims, is now making regular shipments.

KOYUKUK.

The first detailed news received since last winter from the Koyukuk diggings is to the effect that there are 300 men there and half a dozen creeks are turning out well, one property paying \$1000 a day. No one should go there without an outfit calculated to last a year, as food is scarce and transportation difficult.

ARIZONA.

COCHISE COUNTY.

(Special Correspondence).—The Pride of the West, in Washington Camp, which is largely in control of Messrs. Smith, Wilfley & Gee of Denver, Colo., has been enlarged by the addition thereto of the Poole group, which comprises twelve to fifteen claims, adjoining the Pride of the West on the northwest. The newly acquired ground is considerably developed and is said to have 40,000 tons of ore in sight. The Pride of the West plant is to be more than doubled in capacity. It comprises hoisting plant, concentrating mill and smelter. The mill employs the magnetic method of ore separation.

Washington, Aug. 14.

GILA COUNTY.

G. P. Andrews, manager Pinal C. Co. at Globe, states that sinking has been resumed in the Black Copper shaft from the 100-foot level, and that the shaft will be continued down to the depth of 200 feet before another level is opened. A strike of ore has been made in the south crosscut 100-foot level, being 5 feet in width and going 16½ in copper.

R. Fleming, manager Black Warrior C. Co., Amalgamated, states that grading has been begun for the acid works to be erected at Black Warrior.

PINAL COUNTY.

A. R. Renzie, superintendent of the Plata Cobre Co., near Florence, says the company will do extensive development work on its property and by fall expects to have a copper matte smelter in operation.

SANTA CRUZ COUNTY.

The Santa Cruz M. Co. has six claims near Patagonia upon which development is being pushed. The ledge runs from 5% to 8% in copper, with a pay streak 18 inches in width. A double-compartment permanent working shaft has now reached a depth of 70 feet, and will be continued until a depth of 200 feet is reached.

YAVAPAI COUNTY.

It has been announced that the Decatur C. M. Co. would on September 1st resume development work on its group of claims south of Jerome.

A strike of copper ore has been made in the Walker-Larrimore group, near Jerome. The ore averages 15% copper. The claims are under bond to Hooker & McFarland and J. Loosely.

The Standard S. & R. Co., through Douglass, Lacey & Co., its agents, has contracted for the erection of a large concentration plant adjoining the Val Verde smelter on the Agua Fria. It is

expected to have it completed and ready to start up in October. The plant, in addition to working the ores from the mines now being operated under L. D. Phillips, manager, will reduce custom ores.

The Rambler C. M. Co., owning seven claims in the Agua Fria mining district, near Mayer, claims to be taking out rich copper ores. H. Reifsnnyder is president and M. D. Johnson secretary of the company, which has its head office in Los Angeles, Cal.

CALIFORNIA.

State Mineralogist L. E. Aubrey reports that his field assistants have very nearly completed the reconnaissance of the copper deposits. The area of the State which is more or less copper-bearing is found to be very much more extensive than has been supposed. Three other field investigations are to be undertaken shortly. The quicksilver deposits are to be investigated and a bulletin published. The owners of new discoveries are asked to communicate with the State Mineralogist so that they shall receive attention along with the well-known older mines. The borax deposits of Death valley in Inyo county and saline deposits generally in the southern part of the State are to be investigated and a bulletin published. Finally completing the field work for this year, so far as announced, there will be a survey of the gold-dredging operations and a bulletin issued on that industry. Data is being collected for a bulletin on the fuel value of California petroleum. The announcement is made that the mining employment department will be opened at the State Mining Bureau in San Francisco about Sept. 1. It will not be maintained as a general labor bureau, but for the purpose of supplying experienced, skilled and special mining labor. There will be no charges. Miners and mill workmen desiring employment are requested to register at the bureau and mine operators are solicited to make their labor wants known to the bureau.

ALPINE COUNTY.

The Alameda G. M. Co. has been incorporated to operate the Bowlder Hill mine, near Gardnerville. The incorporators are G. L. Loope and G. H. Strong of Bessemer, Michigan, and W. Pickerslein of Oakland, Cal. The principal place of business will be in Reno, Nev.

AMADOR COUNTY.

The east shaft of the Kennedy mine is down about 2400 feet and is being continued. A second tank for fuel oil is being built which, with the tank now in use, will hold a four months' supply. Quartz is being taken out to keep the 40-stamp mill running.

At the George Upton mine, near Plymouth, drifting on the ledge continues, and the face is now 300 feet in. The ledge so far has prospected milling ore. On the south side of the hill samples from the ledge run up to \$14 to the ton. The Pennsylvania owners have taken up twelve claims on property adjoining the mine.

BUTTE COUNTY.

It is said that the Henderson mine, situated near Wyandotte, is soon to be equipped with a quartz mill.

Work has been started at the De Long mine on the North Fork of Feather river above Yankee Hill.

CALAVERAS COUNTY.

The Melones Co. have one gang of men working on the mill at Robinson's Ferry and another putting in a log dam on the Stanislaus river, 4 miles above the Ferry. At Angels the Angels Quartz M. Co. is now crosscutting at the 700 level and the mill is crushing ore from the 500 level. T. Fullen is Supt. A two-ton car is used to carry the ore to the mill. The power used is electricity.

MARIPOSA COUNTY.

About 1000 tons of ore are being hauled from Hunter's Valley copper mine to Merced for shipment. It is thirty years since this mine was worked previous to the present operation. The ore is high grade and carries considerable gold. There are seventeen men employed at the mine. The company expects to erect a smelter in the fall.

MONO COUNTY.

P. Somerville and F. M. Skelton are operating a 6-ton cyanide plant at Pine City, near Mammoth, on 1500 tons of tailings from D. C. Albright's arrastra.

NEVADA COUNTY.

The annual meeting of the Jenny Lind M. Co. has been held at Grass Valley and W. M. Treloar, C. Stocks, O. H. Root, J. H. Oliver, E. K. Smart, J. W. Brown, of Grass Valley and J. Bernhard of San Francisco were elected directors. W. M. Treloar was elected president, C. Stocks superintendent, A. Powell secretary, Nevada County Bank treasurer.

W. H. Bray, who is operating the Posey mine near Nevada City under a bond, has

let a contract for running a 250-foot tunnel to tap the ledge at a point which will give about 150 feet of "backs."

The Ford and Mullen claims, between the Massachusetts Hill and North Star mines at Grass Valley, are to be reopened. A new shaft is to be sunk on the Vulcan. Senator Clark of Montana and others some time ago bonded the property on which the Vulcan stands from M. Ford. F. R. Hinds, representing the bonders, has made arrangements for the building of a 60-foot gallows frame and the doing of other work, indicating an intention to do deep mining.

The Texas M. Co. has let a contract to build the flume from Scotts Flat to the Texas mine, near Nevada City.

PLACER COUNTY.

W. H. Niemeyer and G. W. Manwell of Wheatland, Yuba Co., who are interested in the Zelma Bell Dredger M. Co., owning claims on the Middle Fork of the American river above Auburn, state that the company proposes to build a dredger to work the claims.

The Rocky Bar M. Co. is operating in the American river at Colfax. D. P. Hocking of Oakland and G. W. Crystal and J. Burns of Vacaville are interested in the company.

The ledge at the Central quartz mine, near Damascus, has been struck. Its width is 5 feet and there is about 230 feet of backs on the pay chute to the old stopes above.

A recent shipment of fifteen tons of quartz from the Lost Emigrant mine, near Summit, gave a return of \$135 per ton, at the Selby Smelting Works. This mine is owned by Heath, Jacobs, Goulden & Doolittle.

SHASTA COUNTY.

The old workings and the mill on the Milkmaid mine, near French Gulch, have been closed down, the ore from these works being too low grade to pay. The Milkmaid Co. is now having a hoist and skip built in the old Wheeler shaft, about ½ mile from the Milkmaid, and will resume working on the new ground.

SIERRA COUNTY.

J. M. Harper, of Forest, will shortly commence work upon a gravel claim near American Hill owned by his company.

Development work at the Oakland mine at Gold Lake, above Sierra City, opened up the ledge in five places by shaft and tunnel work. V. C. Julian, the principal owner, says there is plenty of ore in sight, showing gold to warrant putting up a mill, which the owners are now negotiating to secure and erect before fall.

SISKIYOU COUNTY.

At the Ajax mine, near Coles, where a rich 18-inch vein was struck a few weeks ago, another rich strike has been made. The mine is owned by C. W. Martyn, W. F. Farrier, W. Everton, M. C. Gregory, D. E. McCarthy, W. Luster and F. S. Parrish.

The Summerville Hydraulic M. Co. has commenced work rebuilding the Little South Fork and Rush Creek flumes. A new crossing, or an inverted siphon, to bring water across the main South Fork, will also be put in, and the enlarging the pipe to 18 inches is being considered.

F. Smith and A. Parker Jr. of Etna have sold the Summerville hydraulic mine, near Cecilville, to the Salmon River Hydraulic Co., who intend working the claim on a more extensive scale with a large hydraulic plant.

TRINITY COUNTY.

A portable drilling machine has been shipped to the Hay Fork country, where a large area of land has lately been discovered to be gold bearing. W. O. Covert, who will conduct the prospecting, says that the Risdon Iron Works Co. of San Francisco has secured these lands and is doing prospecting. If the drilling indicates pay values the company will put ten or twelve dredgers at work and construct a power plant.

The Union Con. G. M. Co., operating the Dorleska mine, on Coffee creek, near Carrville, has developed a rich shoot of ore in a crosscut from the bottom of an 80-foot winze. The ledge is from 8 to 10 feet wide. A streak from 6 to 18 inches wide has yielded between \$11,000 and \$12,000 in three weeks from a prospecting mill working a ton a day. The company propose to install a new and larger mill this fall. Only the richest ore is now being milled, some of which returned \$1500 a ton on the plates. H. Z. Osborne of Los Angeles and M. MacIlwaine of Abram P. O. are among the principal owners.

TUOLUMNE COUNTY.

A strike has been made in the Tanzy pocket claim, at Sonora, after three years of hard search by the owners. The pocket was at a depth of 200 feet at the bottom of the incline shaft. The amount is stated to be \$15,000. Out of the same shaft, when its depth was shallow, about four years ago, A. Colby extracted a

pocket which yielded \$42,000. The present lessees of the mine are: T. C. Birney, F. Lauener and H. Munroe.

COLORADO.

CHAFFEE COUNTY.

At the present time there are about 300 men at work in the various properties in and around Newitt, near Alma. A Cincinnati company is sinking on the Silver Wave mine, leased and bonded from J. Newitt of Alma. The new company are now down 300 feet. They expect to drift to the vein, which, when cut, will be at a depth of about 500 or 600 feet.

CLEAR CREEK COUNTY.

The Mattie M. Co.'s mill near Idaho Springs has been started up. The mill is soon to be increased in capacity to 120 tons. The production now being made from the mine is considerably more than that. The principal owners of the property are W. H. Colburn and others of Denver.

J. L. Fry, on the Welsh Discovery, is making weekly shipments of ore running 600 to 750 ounces silver and \$35 to \$50 gold per ton. He has seventeen men at work. The shaft sunk 50 feet from the tunnel level shows ore the entire length. This property was idle twenty-two years and was abandoned when Mr. Fry took hold of it last winter.

The Ninety-Four mill, at Yankee, has resumed operations, using the Waugh process of dry concentration. Assays are said to show a saving of 90% of the ore values, with only 10% silica remaining. Mr. Possell, the manager, says that nearly all the dumps in the district that had been taken from the veins would pay to be treated in this mill. Much of the old Stonewall dump has been treated and proved to be valuable.

J. M. Howard has resumed development work on the Peek-a-Boo claim, in West Argentine, and is running a tunnel to find the ore body in depth that crops out on the surface above. The vein carries gold and silver.

McLyman & McGeer are cleaning up the Fort Dodge tunnel, near Georgetown. The Fort Dodge is believed to be the northeasterly extension of the Equator vein, and has shown considerable good ore.

The Old Carnival claim, owned by H. Holcomb, R. J. Manegold and T. Harris, near Argentine Pass, is said to be improving and showing a nice streak of lead ore that carries good values in gold and silver.

DOLORES COUNTY.

The owners of the Silver Swan mine, located on Expectation mountain, near Rico, and covering nearly 200 acres of mineral-bearing territory, have bonded at \$70,000 their property for three years to a local syndicate headed by Mitchell, Summers and others. Work is to be commenced at once.

J. W. Summers has men at work on the A. B. G. mine, at Burns, taking out a 50-ton lot of lead ore as a test of the practicability of mining and milling on an extensive scale. If the returns are satisfactory, arrangements will be made to work the property continuously and, possibly, put up a mill.

GILPIN COUNTY.

Arrangements have been made for development at the Red Cloud mine, in Russell district, Central City.—The new shaft building on the Delmonico property is completed. The new hoisting engine and boiler have been installed and the preliminary work of repairing and unwatering the shaft has been begun. The shaft is reported to be 400 feet deep, and the lessees will probably sink it 200 feet deeper. The property is owned by J. Ross of Leavenworth gulch, but will be operated by Louisville, Ky., parties.

S. Josephi, of the Town Topics G. M. Co., operating the East Notaway mine, in Lake district, has bought the Annex lode adjoining. The shaft is down a considerable depth on the same vein as the Notaway. As a general thing, the ore is of high grade, particularly the smelting ore.

Manager D. McMasters of the Grand Central Co. mines, at Central City, says the east ore shoot has been opened nearly 3 feet wide in the bottom of the 450-foot shaft on the East Whiting lode and averages four ounces gold to the ton. In the 200-foot level the vein carries 2 feet of \$34 ore.

GUNNISON COUNTY.

J. A. Mann, president and manager of the Horton G. M. & M. Co. of Horton, Kan., is developing the A. W. Mann property of three claims on Monumental mountain, Pitkin. The upper tunnel has been driven 200 feet and shows a 16-inch vein, assaying as high as \$125 per ton in gold, copper and silver. The lower tunnel has been driven for a distance of 208 feet, and a contract has been let for 50 feet more, which is expected to cut the vein.

The Jersey Blue Co. has its pneumatic cyanide works at Ohio City in operation. W. L. Read, president of the company,

says the mill will be kept running on the ores of the Gold Brick district.

LAKE COUNTY.

The P. O. S. shaft of the Nubian M. Co. of Leadville is having a large amount of development work done at about 500 feet down, and has recently struck a body of chlorides. The streak is not very wide, but the ore is said to run several thousand ounces to the ton.

LA PLATA COUNTY.

The Needles mining district is attracting attention from development and production of ore from prospects owned by E. Lissner of Durango.

LARIMER COUNTY.

At the Wisconsin lode, recently located by J. & J. Smith, about 4 miles west of Gleneyre, the shaft is now down 52 feet and the workings are in a vein of gray copper, carrying values averaging \$45 to the ton.

PARK COUNTY.

The Excelsior at Alma has been started up by C. N. Perkins of Denver. The work begun comprises the moving and readjusting of the cable tramway and other steps to the more extensive operation of the property.

PITKIN COUNTY.

Preparations have been made to reopen the Leadville mine at Lenado, near Aspen. Prior to 1893 this property was worked. W. J. Long and P. McRea of Aspen have taken in machinery and are doing the re-opening.

A wagon road to the new mining camp at Lincoln gulch, 26 miles southeast of Aspen, is to be constructed. The recent strike made there by a St. Louis company on the Ruby group is said to be improving under development. The company has offered to give \$1000 toward the building of a wagon road to the camp, and Aspen business men and the county will contribute the balance of the \$5000 to \$7000 needed.

SAN JUAN COUNTY.

Ore is being taken out of the Osceola, at Silverton, for trial tests. A large concentrating mill is projected, and tunnels and cuts are being run to determine the exact character and extent of ore bodies, to better design machinery required. A water power has been secured to drive machine drills and the projected mill.

TELLER COUNTY.

The sampling department of the Economic mill has been burned. The loss is estimated at from \$20,000 to \$25,000.

W. M. Moore, manager and part owner of the Empire City, says the mine is yielding ore from a drift on the 50-foot cross-cut from the 800-foot adit. Ten inches of solid smelting ore have been opened on this vein, and returns have shown as high as eight ounces gold. Over 1300 feet of underground workings have shown an average value of six to eight ounces gold.

The Cripple Creek M. Co. has been incorporated, to operate in Cripple Creek district. R. P. Russell is treasurer and general manager; J. G. Berryhill of Des Moines, Iowa, is president. The company holds a lease on the Deadwood No. 2 which has eighteen months yet to run, and also a lease on blocks 4 and 5 of the Vindicator, both of which are shipping ore. Another holding is a lease on the Rubie of the Princess Alice Co. It is proposed to sink the Rubie shaft 300 feet deeper to the 1300-foot point. It is understood that additional leases are to be acquired.

The Schuykill G. M. Co. at Cripple Creek has resumed operations on the Home Run property. J. Doyle is president and T. H. Devine secretary of the company.

Work has been resumed on the Moon-Anchor claim on Gold hill, at Cripple Creek. The main shaft is down to a depth of 750 feet and is to be driven to the 1000-foot point.

The Portland, at Victor, has started to sink the shaft an additional 200 feet. Upwards of forty veins, the greater portion of which carry pay values, have been encountered in the various workings at the tenth level. The present working force employed is 500 men, and it is estimated the output for August will be over 7000 tons.

Dalzell & Wilson, of block 11 of the Vindicator, at Cripple Creek, have made a shipment of three carloads of \$60 ore. The property is showing better values in the 300-foot workings and a much increased production is expected.

The Glorietta M. & L. Co. (King & Whiting) on the Hull City placer, at Cripple Creek, has completed the shaft an additional 100 feet and is cutting a station at 780 feet. The work of sinking will be continued without interruption until the 1000-foot point is reached.

The management of the Victor mine, at Victor, has platted its ground out in blocks for lease and has four sets of lessees at work. Brooks & Hambaugh have made a strike on their block, it is claimed,

by the first blast. They leased a block of the third and fourth levels. The first shot opened a shoot 14 inches in width that carries \$200 gold to the ton. Screenings run \$2000. Among other lessees are C. Miner and W. Camp, who are getting ore from old stopes. The royalty is 35% and the terms of the lease require no development work.

IDAHO.

BLAINE COUNTY.

W. G. Page, Supt., states that the Croesus mine at Halley, which has been idle for several months, will probably be sold soon and started up again. The mine is kept pumped out and is in shape for the extraction of ore, which will begin without delay.

BOISE COUNTY.

The Mineral Hill quartz mine on Ophir creek, between Placerville and Pioneer, has been sold by J. Merrill, J. Lamberton and J. Hanley of Placerville to Ormsby & Co. of Boise, the price reported being \$20,000, part cash. It is expected that the mine will be extensively developed.

The Gold Fork mine, located on Payette river, has been sold by M. B. McGlenn to J. C. Blood of Denver, representing Eastern people. The new owners of the property will, it is said, build a dredger at once.

IDAHO COUNTY.

(Special Correspondence).—The group of mines belonging to the Idaho Reduction & Power Co. is located near Rapid river, a few miles above Pollock, the latter point being at the outlet of the Rapid into the Little Salmon. This company, whose main office is in Denver, Colo., has made a shipment of machinery from the latter place to build a stamp and concentrating mill and also a sawmill. The mill will have twenty-five tons daily capacity to begin with, but it is to be enlarged later. The stamp mill will be operated by water power and the sawmill by steam.

The last Idaho Legislature appropriated \$12,000 to build 20 miles of wagon road from Pollock up the Little Salmon, making a connection between similar State roads to the north and south. The appropriation did not prove sufficient, and the Oregon Short Line and P. & I. N. Railroads came forward with an additional \$6000, and as a result the road will soon be complete. A great deal of the supplies will then go in by way of Council and down the Little Salmon. The large number of claims located along the Little Salmon and Rapid rivers is an indication of the interest being taken in this section of country.

Pollock, Aug. 13.

The Midas G. M. Co., controlled by Finch & Campbell, expects to put the 10-stamp mill on the Ajax, at Dixie, in operation immediately. There is claimed to be enough ore blocked out to run the mill for a year.

A 10-stamp mill will be installed on the Utopia mine at Grangeville soon.

W. H. Regua reports that a rich placer strike has been made by a man named Childs, about 10 miles from Elk City. Mr. Childs takes out about \$500 every week.

F. J. Conroy of Baker City, who is an owner in the Last Chance, Monarch and other mines at Atlanta, says that at the mines twenty-two men are employed, with C. Lange of Boise, Supt. The old tunnels on the Monarch are being cleared and the water is being taken out of the main shaft of the Last Chance. He further states that there are some thousands of tons of \$6 ore on the dumps of the mines. At present this ore will be milled and concentrated, but if the mines when opened show considerable quantities of similar ore it is likely a chlorination plant will be put in. It is the intention to add ten stamps to the mill.

A. E. Mohr of Dayton, O., has made a strike of a ledge reported to be 2 feet wide near Pierce City. The ore shows much free gold.

SHOSHONE COUNTY.

Larson & Greenough's Morning M. Co. has struck ore 1700 feet in No. 6 tunnel, which is being driven from the mill. The tunnel will be 2 miles long when completed and many big ore bodies are expected to be cut before the You Like and Morning veins are cut.

The tunnel on the Springfield copper mine on Stevens peak, near Wallace, has cut the ledge and found 6 feet of ore, showing values of \$22.62 in gold, silver and copper.

MONTANA.

GRANITE COUNTY.

The American G. M. Syn., incorporated by the McLure Syndicate of St. Louis, Mo., has bought the Sweeney sapphire claims on Rock creek. The syndicate has been working both properties for some time and has opened a lapidary shop in Helena with W. E. Knuth, manager, to cut the stones before shipping them for sale. The Rock Creek mines consist of

both placer ground and the porphyry reef, in which are found not only blue sapphires, but many shades of pink and green. This syndicate is believed to have acquired all the known sapphire ground in Montana except those of the New Sapphire Mine Syndicate and the bars of the Missouri river, which have not been worked.

JEFFERSON COUNTY.

It is reported that the Basin & Bay State M. Co. is to resume operations under F. P. Chapin, president of the company.

Ax, Downey & McLaughlin, the owners of the Ada mine, have men at work on their mine at Basin. The ore carries considerable copper and will be shipped.

At Gray Eagle work is being pushed by the company that ex-Governor Lind of Minnesota is interested in, and he is at the mine. The bond is for eighteen months and the price is said to be about \$80,000. N. Lind is the assayer in charge.

W. J. Heaney, Supt. of the Cataract Copper Co., says the company is doing development on the Bullion, Blue Grouse and Crystal claims, and that there are from 2 to 7 feet of shipping ore in every shaft and tunnel.

L. S. Wild of Butte is working the Monarch mine, near Bernice, in the Lowland district. He has a lease and bond at \$22,000 for eighteen months.

H. Schmidt has made a strike on his quartz claim, near Whitehall. The claim, known as the Black Eagle, has been developed to a depth of 40 feet, and at that depth shows a vein of gold-bearing quartz 2½ feet in width, assaying \$75 per ton.

LEWIS AND CLARKE COUNTY.

The Howard mine, near Helena, operated under bond by C. A. Sheldon, has commenced making ore shipments.

The Montana M. Co. is preparing to abandon the lower workings of the Drum Lummon mine at Marysville. The pumps will be pulled and the lower workings from the seventeenth to the fourth level will be abandoned. The company proposes to develop other properties in the neighborhood of Marysville. It recently shipped 30 of its 110 stamps to Idaho, where it is engaged in mining.

Fetter Bros. and associates of Kansas City, Mo., and E. E. Stephens of Ogden, Utah, have bought the Black Pine mine, on Copper creek, near Helena. They have been operating the mine under bond for two years. Arrangements to work the property upon a more extensive scale have been made. The price paid for the mine is said to be \$15,000.

In the Penobscot mine at Marysville, operated under lease by M. A. Alderson of Helena, ore has been struck in the Leopard and Snowdrift vein, where the former owners had run off the ore bodies.

J. V. Cole of Marysville has struck the ledge at the head of the tunnel on his property near Bald Butte. He has shipped two cars of ore running from \$70 to \$80 a ton from the upper levels.

The North Star mine at Marysville has been leased by T. Cruse to P. Dillon, and it is reported that the latter will put fifty men to work in it.

It is expected that the 500-ton cyanide plant at the Empire mine will be started about September 15. The mill will first treat the tailings, of which there are 75,000 to 100,000 tons in the dam. It will then work ore from the mine.

The 100-ton cyanide plant recently erected has started to treat the tailings of the Prize mine at Granite Butte, 18 miles from Marysville.

The shaft on the Ophir, at Blackfoot City, is said by T. Hurd of Spokane, Wash., one of the owners, to be down 110 feet on a vein of 4 to 5 feet of ore. The ore carries from 8% to 10% copper and some carries silver and \$4 or \$5 in gold. There is a steam hoist, capable of going down 500 feet, and pumps on the mine. M. Mitchell, T. Garrison and W. Y. Clark of Spokane, Wash., are interested with Mr. Hurd in the mine.

MADISON COUNTY.

The Watseka mine, at Rochester, owned by C. Hand of Butte, A. W. McCune of Salt Lake and the estate of W. L. Hoge, is claimed to be one of the richest gold mines in Montana, the first-class ore going from \$100 to \$400 a ton and the second-class from \$18 to \$20. The former comes from a shoot from 1 to 4 feet wide on the 300-foot level and the latter is taken from a vein from 6 to 10 feet wide. The first-class ore is shipped, but the second-class is treated at the mine.

J. F. Dulles and others are working the Hudson copper mine at Silver Star, and are said to have a bonanza. The shaft is down 300 feet and the lead is said to be getting stronger and richer as depth is attained. The ore averages 21% copper.

At the corundum mine near Camp creek fifteen more men have been put to work and considerable machinery has been ordered by the owners, H. Kirk, F. L. Kline and others of Bozeman.

POWELL COUNTY.

J. Minchin, of Boston, Mass., acting for New England people, has bought a large interest in the Ptarmigan group of mines owned by T. Cooney, C. J. Fulton and others of Helena. The property comprises fifteen mines, some of which are well developed, and from which shipments of high-grade gold ore have been made to the value of \$100,000. Development of the entire group will be prosecuted this fall and winter by a tunnel driven on the main vein at a point admitting a depth of 1200 feet on the ore bodies. A large milling plant will subsequently be erected for the treatment of the ore by amalgamation, fine concentration and cyaniding. The new company proposes to develop water power from the Big Blackfoot river through 2 miles of ditch, by which sufficient fall will be gained to give 145 H. P. at the mill.

SILVER BOW COUNTY.

After suspension for two years one of the stamp mills of the Alice M. Co. at Walkerville will be started up. Workmen have put the machinery in shape and are making other repairs about the plant. A cyanide plant will be added to the mill.

The Montana Ore Purchasing Co. at Butte is handling very little custom ore at present. It is said to be treating about 1000 tons of ore per day from its own properties. The producing mines are the Rarus, the Minnie Healy, the Clinton, in Park canyon, the L. E. R. and the Cora. The L. E. R. is down 600 feet and several adjoining properties are worked through this shaft.

C. Stowbridge, manager of the Brown's Gulch Homestead Co.'s mine near Butte, reports that the vein has widened to 4½ feet. The shaft is down 195 feet. At 170 feet the ore returned an assay value of \$96 gold per ton. The new machinery recently installed is working well.

NEVADA.

LINCOLN COUNTY.

The plant of the Mineral Union Con. Co.'s mines, situated at Goode Springs, which was erected in 1898 and 1900 at a cost of about \$80,000, has been bought by S. H. Lucas of Los Angeles, Cal., who proposes to remodel the works into a concentrating plant, with a capacity of 100 tons daily. It is expected that the railroad, now toward Goode Springs, will be completed to that place by January 1st. A copper matte smelter will then be added to the works.

T. R. Jones, J. Eisenman and others have sold to G. C. Fetterman of Pioche the Magnolia group at De Lamar for, it is reported, about \$100,000.

ORMSBY COUNTY.

A promising find has been made in the Gardner mine, near Carson. At a depth of about 60 feet a body of copper ore 2 feet wide has been encountered. The ore consists of chalcocite and bornite. The mine is located on a mountain of quartz, from which assays of gold and silver average from \$1.50 to \$2.75 per ton. A 5-stamp mill has been started at the mine and returns are \$2 a ton.

WASHOE COUNTY.

On the Gulling ranch, near Reno, a lead about 3 feet wide of hard quartz with an iron capping has been found. Outside of a rich stringer the lead assays \$12 a ton in gold. A shaft is being sunk on it. The mine is owned by Gulling Bros., Branley, Henry & Spencer.

NEW MEXICO.

GRANT COUNTY.

The Arizona mine, near Pinos Altos, owned by St. Louis people, is being worked under lease by W. McAllister of Silver City. The ore, which is pyritic, runs heavy in gold, silver and copper. Most of the mining is being done on the 75 and 155 foot levels. At this latter level is a 3-foot vein of gold-bearing ore of too low a grade to bear shipment to the smelter, but which, if concentrated, would pay. The lessee is considering the advisability of erecting a concentrator, the water problem being the greatest obstacle to overcome.

Owen Bros. have completed a 175-foot tunnel on their Copper Belle and Independence mines on Hanover mountain, at Fierro. In driving the tunnel several strata of rich ore were met with, some of it assaying as high as 42% copper. The work will be continued.

The Modoc, which is being operated by the Phelps-Dodge people at Fierro, has reached a depth of 200 feet in the incline shaft. The ground is becoming softer and great quantities of water are being encountered, requiring large pumps to keep it down.

RIO ARriba COUNTY.

The Bromide mine at Bromide is in operation, a Colorado company having taken a fifteen years' lease on it and commenced operations.—The Copper Knot mine has been secured by V. E. Lawton

of Chicago, who will develop it. C. Taylor is Supt.—The P. M. & M. Co. has let a contract for 100 feet of crosscutting and will cut the Elliott lode at 180 feet from the surface.

OREGON.

BAKER COUNTY.

The Turnagain Arm G. M. Co. has bought from H. Shurtliff, W. Young and J. Smith the Cable Cove and Ceda mines for \$10,000. The properties are near the California mine, which the company bought.

Grant and Baker counties and owners of the Baby McKee and Free Coinage mines have decided to build a wagon road from the Free Coinage mine to the Baby McKee, thence via the California to Cable Cove, and from there via John Day divide down the middle fork of the John Day river, connecting with one of the main county roads. The total cost will be \$4000, one-half of which will be paid by the mines and the other half by Baker and Grant counties.

J. L. Hunter and J. Bruner are leasing the Worley mine. The tunnel is in 280 feet. A crosscut will be run to tap the main ledge about 70 feet below the surface. The ore, as milled, runs about \$100 to the ton.

W. L. Vinson, manager of the Gem mine at Sparta, has bought a 10-stamp mill at Robinsonville and has had it removed to Sparta. The plant of the Gem will be increased to forty or fifty tons daily capacity.

JOSEPHINE COUNTY.

The Fortune M. Co. has been incorporated, capital \$50,000, by O. S. Goodnow, J. Ward and J. L. Wiggins. The company is developing a number of quartz properties in southern Oregon, among them the Horseshoe mine on Foots creek, near Grant's Pass, where a 5-stamp mill is now being constructed.

J. R. Harvey of Grant's Pass, manager of the Old Channel hydraulic mines, in the Galice Creek district, states that preparations are being made for a big run this coming winter. The mines were recently bought by Eastern people for \$90,000.

Reports from the Mountain Lion mine, on Applegate river, near Grants Pass, say the ledge—all mill rock—is from 4 to 5 feet wide, and the rich pay streak from 3 to 18 inches. The tunnel is now in about 800 feet. The owners are Jewell, Harmon & Bailey Bros.

LINN COUNTY.

C. W. and C. M. Young have transferred their option on the White group, in the Blue River district, near Eugene, to J. E. Blazier. Among the claims covered by the option are the Sunset and Yankee Girl. It is the intention to continue development work and in a short time erect a small mill.

SOUTH DAKOTA.

PENNINGTON COUNTY.

The Cochran mine, at Rochford, is said to be producing very rich ore from a shaft in the ore shoot which is estimated to be 75 feet wide and 400 feet long. J. Cochran is the owner of the mine.

The Best M. Co. has opened a mine near Rochford in Hornblende camp. A tunnel has been run about 400 feet which has cut through a ledge of free-milling ore over 30 feet wide. The assays run from \$2 to \$5 per ton gold. The company is composed of Malvern, Iowa, people. It is planned to build a small stamp mill. G. Best, formerly of Bayfield, Wis., is president of the company, with office at the mine.

It is reported that the Black Hills Belt Dev. Co. has obtained a water right and mill site on Rapid river, near Rochford, and that work has been commenced on a flume to take out the water for the mills.

The Standby mine, at Rochford, is to be reopened after being closed down for six years. It is owned by New York people. A 1500-foot tunnel at the ore-bin level of the stamp mill taps the main ledge. The ore shoot is very large, and in many ways said to be like the Homestake. The owners are planning to put in concentrators at the 60-stamp mill and add a cyanide plant.

UTAH.

BEAVER COUNTY.

The Golden Reef M. Co. has been incorporated at Milford, with a capital of \$100,000. D. W. Woodard is president and H. N. Hayes secretary. The company owns the Golden Reef and eleven other mining claims.

J. E. Kingsbury, formerly of Stockton and now of Park valley, Box Elder county, is reported as having secured a \$20,000 option on the old Monte Cristo group, near Frisco, for Eastern people, who will start the mine up.

The Blue Jay Extension M. Co. has

been incorporated, capital \$5000. F. Sugden is president and L. H. Gray secretary. The company owns the Blue Jay Nos. 1 to 6 mining claims and a lease on the Blue Jay and Trojan and Mona claims, in the Washington mining district.

The Golden Reef M. Co. has been incorporated at Richfield, Sevier county, with capital \$100,000. The company owns the Golden Reef and eleven other claims near Frisco. D. W. Woodward is president and H. N. Hayes secretary, with office at Richfield.

The Majestic M. Co.'s mine near Frisco, A. B. Lewis of Salt Lake City president, has recently shipped ten carloads—258 tons—of ore, which went 40% copper, \$4 gold and 7.6 ounces silver to the ton. The shipment came from the O. K. claim of the Majestic group. The total value of the shipment was \$30,000, at the rate of \$116 per ton. The ore will net to the company about \$100 a ton. It is the intention of Mr. Lewis to proceed at once with the construction of a big smelter for the joint use of the Majestic, Imperial and Royal Companies. It will be of a sufficient capacity to take care of all the ore produced that the management may care to handle on the ground. The mines are on the Frisco branch of the Short Line, so that the transportation problem does not have to be solved. The ore just shipped was not the first shipment from these ledges. About twenty-five years ago seventy-five tons, which averaged 69½% copper, were taken out and sent to Baltimore, where the only copper smelter then in operation in this country was located. At that time copper was not so valuable as it is to-day, and the work of developing the mines was allowed to lapse.

BOX ELDER COUNTY.

L. B. Hughes, W. H. Dodge and J. Snell of Salt Lake City, owners of the El Amigo mine, in Park valley, have decided to equip the mine with a 5-stamp mill, which will be put in immediately.

The Century M. Co. has decided upon a water route across Salt Lake to supply their mine and mill in Park valley, and are now gathering data upon the cost of equipment. The proposed route is from a point on the south shore to a landing about 6 miles west of Kelton; thence to the mine, the distance will not exceed 30 miles, the haul exceeding that between the mine and Kelton by about 6 miles only. To take in supplies and bring out concentrates a scow propelled by gasoline engine is already being arranged for. The condition that led up to the development of the water route is said by one of the company to be railroad freight rates. For the carriage of 5000 pounds of concentrates from Kelton to the Germania smelter, near Salt Lake, the railway had taken, it is said, \$119.50, or nearly \$50 per ton, while for a ton of \$4 coal which is taken into the camp the company is required to pay \$4.50 freight.

JUAB COUNTY.

The Carisa C. & G. M. Co. has been incorporated, with \$625,000 capital, with office at Salt Lake City. C. K. McCornick is president and J. S. Gard secretary. The company owns the Carisa, Miner's Delight, Wolf, Northern Spy, Jim Fisk, Cordelia Orton and Victor mining claims and two-thirds of the California, Nevada and Lake View claims at Tintic.

The St. Louis M. Co. has been incorporated, capital \$30,000. The company owns the St. Louis No. 1 to No. 4 mining claims at Tintic. W. Hedrick is president, J. W. Hatfield secretary and treasurer, with office at Salt Lake City.

PIUTE COUNTY.

The Silver Cave M. Co. has been incorporated at Junction, capital \$20,000. J. A. Hill is president and A. Jensen secretary and treasurer. The company owns the Silver Cave group of mines in the Mount Baldy mining district.

SAN JUAN COUNTY.

The International Copper Co.'s mine at La Sal is showing up satisfactorily. Two veins have been opened, in one of which the ore runs 8% to 15% copper, with small gold and silver values. S. A. King, J. W. Burton and T. Rosecamp of Salt Lake City are among the principal owners.

SALT LAKE COUNTY.

J. H. R. Thompson, B. T. Hickman and M. C. Smith have bonded the Centennial group at Bingham from C. H. Lashbrook, and with Mr. Smith as manager have begun work on it. A lower tunnel, now in 200 feet, is being driven to cut a cross vein.

The Mystic Shrine mine at Bingham is being operated under bond and lease by M. McGrath.

With 4000 tons of ore estimated as blocked out in the Silver Hill (Red Wing) claim at Bingham, the construction of a gravity tramway to the dump at the gulch bottom is under consideration. It is estimated that the tram would reduce transportation expense 60 cents per ton.

The Cornucopia M. Co. has been incor-

porated, capital \$30,000. E. H. Green is president and J. J. Whitaker secretary. The company owns the Horn of Plenty group of mining claims in the Big Cottonwood mining district.

The Western Exploration Co. has been incorporated in Salt Lake City, capital \$1,000,000, to operate the Sampson Co.'s mine and a half interest in the Yosemite mine at Bingham; control of the Boss Tweed group at Tintic; the option on the New Pass group in Lander county, Nev.; the Crown Point group of Elmore county, Idaho, and other properties. The company will manage the affairs of each company from one office and with the same management staff. W. F. Snyder has been made president, W. G. Filer vice-president, secretary and treasurer, G. Snyder assistant secretary, these officers, with P. S. Kimberly of Sharon, Pa., and B. Snyder, forming the board of directors.

SUMMIT COUNTY.

The Martin G. & S. M. Co. has been incorporated, with \$30,000 capital. A. F. Martin is president and B. E. Hartwell secretary and treasurer. The company owns the Deer Trail and other mining claims in the Uintah mining district.

The David M. Co. has been incorporated with \$150,000 capital and office in Salt Lake City. J. Duffy is president and E. McGurrian secretary. The company owns the Black Bear and other mining claims in the Uintah mining district.

A. H. Steele of Salt Lake City, secretary of the Western Monitor M. Co., operating at Park City, states that they are driving the tunnel 75 feet farther in to strike the vein. It is a copper proposition, with ore said to go \$100 to the ton.

The Martin G. & S. M. Co. has been incorporated in Park City, with capital of \$30,000, to operate the Martin mine in Thayne's canyon.

TOOELE COUNTY.

At the Honerine mine at Stockton a three-compartment shaft is to be sunk to the 900-foot level before drifting from it. C. H. Scheu is manager.

WASHINGTON.

COWLITZ COUNTY.

The Darnell M. & M. Co., capital \$720,000, has sunk a 300-foot shaft at Kalama. The mine will ship two carloads of ore daily until its own smelting works are built. A contract has been let for a 40-ton reduction plant. The ledge in which the company is now working is about 30 feet thick.

CHELAN COUNTY.

Part of the grade between Lake Chelan and the Holden mines has been completed by the Chelan T. & S. Co., which expects to build a railway to the mine. T. Maloney is manager of the company.

The American Flag Co. of Spokane, working the American Boy at Methow, has its 20-stamp mill completed. C. Anderson, vice-president of the company, says the company has done between 2000 and 3000 feet of development work and opened a fine body of free milling ore. It is planned to put in a cyanide plant later to treat the tailings. An electric light plant is just completed. The mine is working about thirty-five men. The American Flag Co. is controlled by T. S. Griffith, F. R. Insinger, C. Anderson and M. McKane of Spokane and H. Cornwall of Colfax.

FERRY COUNTY.

Work is to be resumed on the Scotia and Champion, on Kettle river. C. E. Hoffman of Spokane is Supt. A tunnel over 100 feet has been run; also, a 50-foot shaft sunk. Thus far the showing is good. The company expect to place both the Scotia and Champion on a shipping basis this fall.

The Phil Sheridan, at Republic, which is under bond and lease to J. Cronin, is showing up well. The ore body is 4 feet in width and said to go about \$50 per ton. The ledge has grown stronger and more uniform in width and value from the surface to the present level.

E. J. Delbridge, superintendent of the California mine at Republic, operated by the Apollo G. M. Co. of Hartford, Conn., says the mine is improving with every foot of development. There is 2 feet of ore in the bottom of the 400-foot shaft and good ore in the levels. Thirty men are employed about the mine. Six hundred tons of shipping ore is on the dump.

Discovery claim of the Granite Creek placers at Republic is now running with five men employed cleaning bedrock. There is about 5 feet of gravel that is being shoveled into the sluices. Large boulders make the work progress slow. The bedrock is soft granite. The owners are said to have refused several offers to buy the claim.

D. C. Jackling, late manager of the Republic mill, states that the closing of the mill was due solely to inability to get enough ore from the Republic mine for running the plant. "The charge has

been made that the mill was not suited to the ore found in the lower levels of the Republic." Mr. Jackling says that the charge is not true. "The mill was completely successful. From the time that it started up to the close of operations we recovered 91% of all the gold in the ore submitted to us. We recovered 85% of all the values, including silver. There seems to be a misapprehension with regard to an increase in the amount of silver with depth. The silver values of the Republic mine did not average \$1.50 per ton. The greatest assay in silver ever got from a shipment of Republic ore was five ounces, or less than \$3. The mill was in operation somewhat less than nine months. In that time we handled custom ore from the Tom Thumb, the Ben Hur, the Quilp, the San Poil, the Black Tail, the Pearl and the Lone Pine-Surprise. The average of those ores was three and one-half ounces, or about \$2 per ton in silver. Owing to inability to get ore, the mill never had a chance to work at its full capacity, which was 5400 tons a month. Consequently we never had a chance to show what the mill would do in the way of economical operation under normal circumstances."

KING COUNTY.

The Seattle Smelting & Refining Co. has been incorporated by J. Mayer & Bro. of Seattle and R. L. Whitehead of Philadelphia, with capital \$25,000. The company has leased for five years a building in Seattle which is to be immediately remodeled and a plant put in. Gold, silver and platinum will be handled at the beginning, but it is the intention later on to supply equipment for the refining of copper and lead. J. Mayer is president and R. L. Whitehead secretary and manager of the company.

LINCOLN COUNTY.

The Turk M. & M. Co. is planning the erection of a 50 or 60-ton smelter at Cedar canyon, on property owned by the company, 7 miles from the Spokane river. A. W. Turner is president and H. A. Turner secretary of the company, with office at Davenport.

PIERCE COUNTY.

Denver, Colo., people propose to build a large smelter at Darrington, the new mining town in the Cascade mountains, to which the Northern Pacific branch has just been extended. A written proposition to owners of Darrington mines has been submitted, asking for a location for a smelter, together with guarantees of water power and 2000 tons of ore monthly carrying 3% copper. F. Perkins of Colorado Springs, Colo., represents the Denver people.

SPOKANE COUNTY.

The American Placer M. & M. Co. has been incorporated at Spokane; capital, \$150,000. The trustees are W. H. McVey, W. D. Wrighter, W. O. Jones, D. C. Wrighter and J. H. McVey of Spokane, B. Baumann of Chicago, Ill., and T. A. Noble of Pittsburg, Pa.

WYOMING.

BIG HORN COUNTY.

J. C. Schnitzel of Deadwood, S. D., has bought nine claims and a one-half interest in the Beyam mine at Kirwin. The prices paid range from \$100 to \$2500.

FREMONT COUNTY.

The Carrissa gold mine near South Pass is to put in a 200-ton cyanide mill at once. Owners of this mine claim they have over 200,000 tons of ore blocked out that will average about \$16 per ton. The company will put on an automobile between the mine and Point of Rocks, on the Union Pacific, to haul supplies to the mine.

FOREIGN.

BRITISH COLUMBIA.

The Prospector's Exchange of Nelson says the manager of the Noble Five M. Co. reports work done during July on the mine near Slocan: In tunnel a crosscut has been driven 133 feet toward the Last Chance ledge. Last Chance tunnel No. 3 has been drifted on the ledge 35 feet, cutting three shoots. Twenty-four tons ore shipped to the smelter returned \$80 per ton.—The B. C. Copper Co., Greenwood, has contracted with the B. C. mine for the treatment of 200 tons of ore per day. The smelter will soon be in position to treat 800 tons per day.—The Great Dane group of mines, Fort Steele division, has been purchased by J. C. Drewry for \$40,000. There are two strong ledges on the property; one, from 9 feet to 12 feet wide, carries between 4½ feet and 5 feet of solid galena; the second ledge carries about 2½ feet galena ore. Sawyer Bros. have taken a contract to run a 200-foot tunnel on this group.—F. Robbins, manager of the North Star mine, in East Kootenay, says that about 1000 tons of ore are being extracted per month. The mine has paid five dividends of \$39,000 each, or a total of \$195,000.—A group of fifteen claims at

Kitchener, East Kootenay, has been bought by a Montreal syndicate for, it is said, \$100,000 cash. The claims contain a continuous body of high-grade hematite iron ore, varying from 50 feet to 200 feet in width. Best assays show 66% metallic iron, 2% silica, .03% sulphur and a trace of phosphorus; the average of twenty assays taken from different parts of the property give: metallic iron, 55%; silica, 10%; sulphur, .05%; phosphorus, .01%.

—Arrangements have been made at the Arlington mine, Slocan, for shipping 1000 tons of dry ore monthly.

Nelson, Aug. 17.

J. C. Drewry of Rossland has bought the controlling interest in the Great Dane mine, including the Great Dane, White Star and Fisher claims, situated on Morris creek.

The Canadian King M. Co., operating near Erie, has bought a three-drill compressor. J. C. Odell is president of the company.

Sixteen men are in the Rainy Hollow country, near Porcupine, doing assessment work. J. Smith, one of the original locators, is developing his claims. Captain Jarvis of the Northwest Mounted Police at Pleasant Camp, is an owner of claims in the district. The district is near the head of the Klehena river, on the Dalton trail, and was discovered late in 1898. Copper is found there in bornite, chalcopryite and malachite, occurring in veins from 18 inches to 2 feet in thickness. Assays of copper ores from this region run from 20% to 55%. The district is 50 miles from Pyramid Harbor.

Figures compiled by the American S. & R. Co. show that the total output of the provincial lead mines for the six months ending June 30th was a little less than 30,000 tons. Of that 9000 tons were furnished by the St. Eugene in East Kootenay and treated at European smelters. The rest was handled at the Trail and the Hall Mines smelter and at the plants in the United States outside the smelting trust. The St. Eugene is now closed down on account of the market. The North Star is still shipping on contracts. The Payne is idle. Shipments from the lead mines of the Slocan amount now to only about 100 tons per week. The Rambler-Cariboo, the Slocan Star and the American Boy are about the only producers.

F. A. Heinze of Butte, Mont., and several associates, have bought the controlling interest in the Britannia copper mine at Howe sound, 30 miles north of Vancouver. About \$300,000 is said to have been paid for 51% of the stock. It is proposed to erect a large smelter on the property at the water's edge at once. The Britannia mine is composed principally of a series of copper-bearing bluffs, in which there are now several million tons of ore, either blocked out or in sight, ready for easy mining.

H. Donough says of Franklin camp, situated on the east fork of the north fork of Kettle river, about 45 miles from Grand Forks, that the mineral showing of that section surpasses, if anything, the Boundary. The ledges are large, the formation favorable, and the values in gold, silver and copper are very good. An open crosscut 12 feet wide and 16 feet deep on the Banner is all in ore, and the walls on either side have not been reached. This ore will average \$20 per ton. A crosscut tapping the hill at a depth of 250 feet has traversed over 30 feet of \$8 ore.

A consolidation has been made by the Athabasca G. M., Ltd., and the Venus G. M. Co., under the name of the Athabasca Con. Co., with head offices at Ontario. The Athabasca at Ymir has a stamp mill and cyanide plant, which have been practically idle from lack of ore in the Athabasca vein. The Venus mine has no mill, but between 16,000 and 20,000 tons of ore have been already blocked out. This ore, which averages \$16 per ton, is sufficient to keep the stamp mill at Athabasca in full work for two years. The two properties are about 1/2 mile apart and an aerial tramway will be built to cover the distance.

MEXICO.

C. O'Keefe, president of the Sonora M. & M. Co., operating silver properties in the Altar district in Sonora, has had the La Fortuna, Sernena, Esperanza, La Fortunita, Penasco Quemado and Siglo Nuevo claims connected by wagon road. J. W. Walsh, the mine superintendent, has a large force of men getting out ore.

THE KLONDIKE.

J. R. McGovern of Dawson says that in his opinion winter work in the Klondike will be discontinued and the summer season adopted. The creeks which produced the large amounts of gold at the first of the Klondike excitement would not now produce gold in large quantities. Gold in paying quantities, however, could continue to be taken out if they were worked in summer. Eldorado and Bonanza creeks were particularly referred to. Hunker and Dominion have turned out well this

season, but the Eureka has not come up to expectations. The Rob Roy, according to Mr. McGovern, has done nothing this year as yet.

Personal.

W. CHINO, Supt. Shannon copper mine, Clifton, Ariz., is in Europe.

D. C. JACKLING has resigned as Supt. Republic mill, at Republic, Wash.

J. MARTIN has been appointed Supt. Copper Mountain M. Co., at Stoddard, Ariz.

G. CRANE has been appointed Supt. Arizona G. & C. Co. Smelter, Patagonia, Ariz.

J. P. TURNER has resigned as Supt. Ashbrook mine, in Box Elder county, Utah.

S. W. TYLER, M. E., has returned to Denver, Colo., from extended work in Arizona.

H. P. BAKER, manager Garfield mine, at Brigham City, Utah, has returned from New York.

A. R. BENZIE, Supt. Plata Cobre copper mine, in Pinal county, Ariz., is in Denver, Colo.

T. S. LAWLOR has been appointed on the office staff of the State Mining Bureau at San Francisco.

M. DUFFY of Cripple Creek, Colo., has been appointed Supt. Minnie Moore mine, at Hailey, Idaho.

J. E. BEVERIDGE of Salt Lake City, Utah, has been appointed manager New Pass mine, near Austin, Nev.

A. STAHLGREN has resigned the position of mechanical engineer of the Mountain Mines, Ltd., Keswick, Cal.

W. DAVIDSON of Salt Lake City, Utah, has returned there from a professional trip to Prince of Wales Island, Alaska.

E. J. GILBERT, formerly a Supt. for the California Ex. Co., Tuolumne county, Cal., is now Supt. Mowry mine, Mowry, Ariz.

T. FISHER of Helena, Mont., has been appointed Supt. of construction of the 100-stamp mill to be built by the Amalgamated Copper Co. at Pony, Mont.

P. C. DUBOIS, field assistant to the State Mineralogist of California, is examining the copper deposits of Madera, Fresno, Tulare and Kern counties, Cal.

HERBERT WATERMAN of the Hendrie & Bolthoff Mfg. & Supply Co. of Denver, Colo., returns this week from San Francisco, Cal., where he has been making an extensive sojourn.

W. B. GESTER of Newcastle, Cal., and late of Saucillo, Chihuahua, Mexico, is now manager Unity M. Co. and the Bully Choop M. Co. of New York, operating in Trinity county, Cal.

Catalogues Received.

Machinery Catalogue No. 9, issued by the Hendrie & Bolthoff Mfg. & Supply Co., Denver, Colo., making an admirable reference book for those connected in any way with the mining industry, contains fine engravings of all types of standard machinery and equipment for mines, mills and smelters, accompanied by careful descriptions thereof, with valuable suggestions on erecting and operating. The work includes numerous well executed designs of modern milling plants. Among the illustrations are observed neat cuts of new machines for shop work. The catalogue is alphabetically indexed, so that any subject may be found with no delay.

THE Pelton Water Wheel Co. has issued the eighth edition of its Trade Catalogue, revised and with additions. In addition to the English edition, one in Spanish has been issued for Spanish speaking countries. Like the preceding editions, this one contains much useful tabulated information relating to the use of water for power. The company will be pleased to mail the catalogue on application to their home office, 125 Main street, San Francisco, Cal., or to the office of their Atlantic department, 143 Liberty street, New York.

Recently Declared Mining Dividends.

| | | |
|-----------------------------------|---------------------------------------------|----------|
| Ontario S. M. Co., Utah, monthly, | 10 cents per share | Sept. 3 |
| Homestake M. Co., South Dakota, | monthly, 25 cents extra, 25 cents per share | Aug. 26 |
| Gold Coin G. M. Co., Colorado, | monthly, 3 cents per share, | \$30,000 |
| Consolidated Mines Co., Colorado, | monthly, 1 cent per share, | \$19,000 |
| New Zealand G. M. Co., Colorado, | monthly, 1 cent per share, | \$7650 |
| Gwin Mine Dev. Co., California, | No. 24, 10 cents per share, | \$10,000 |
| | | Aug. 20 |

Commercial Paragraphs.

H. S. SANDS AND F. P. WOOD, electrical engineers, have formed a partnership and opened an office at 1033 Seventeenth St., Denver, Colo.

THE Benicia Agricultural Works, Benicia, Cal., will, on receipt of drawings, furnish estimates for castings for machine, smelter and structural work.

THE Stilwell-Bierce & Smith-Valle Co. of Dayton, Ohio, have just shipped to the Cardiff Coal Co., Keddick, Ill., a Stilwell improved feed water heater and purifier, another to the Tug River Coal Co., Tug, West Va., and a third to the Pittsburg Coal Co., North Star, Pa.

H. V. CROLL, who has been manager of the Spokane, Wash., branch office of the Edward P. Allis Co., has been appointed manager of the branch office to be established at 414 Dooly Block, Salt Lake City, Utah, for the Allis-Chalmers Co., with the territory of Utah, Nevada, Montana and southern Idaho under the direction of that office.

THE Clot & Crist Machine Co., 137-139 Beale St., San Francisco, has recently applied for a patent on a direct-acting steam pump, specifications of which cover some novel features relating to steam chest, valve movements, etc. The moving parts are case-hardened and interchangeable, and while tightly closed in, are easy of access by the removal of half a dozen nuts. These pumps have been tested, and fifteen of different capacities are reported under construction on orders.

J. GEO. LEYNER, manufacturer of air compressors and drills, Denver, Colo., recently supplied compressors and drills for the following properties: The Carr mine, Central City, Colo.; the Centennial mine, Georgetown, Colo.; the Idaho Springs Gold Producing Co., operated by Marshall Bros. of Georgetown, Colo.; the Modoc M. Co. at Las Cruces, N. M.; the Aberdeen Copper M. Co. at Lordsburg, N. M.; shipped a six-drill compressor and four drills to a point in Alaska; are building a compressor and drills for the Empire Tunnel Co. at Empire, Colo.

Notices of Recent Patents.

Among the patents recently obtained through Dewey, Strong & Co.'s SCIENTIFIC PRESS U. S. and Foreign Patent Agency, the following are worthy of special mention:

SACK HOLDER.—No. 680,381. Aug. 13, 1901. W. M. Inman, Randsburg, Cal., and C. C. Inman, Bishop, Cal. This is a device for holding the mouths of sacks open for the purpose of filling. It consists of standards, and a base to which they are fixed, means for adjusting the standards vertically, an elastic extension to one of the standards, and both extensions having their upper ends curved and provided with transverse spreaders with sack-engaging hooks so that the latter may be attached and the sack held open until properly filled.

FURNACE FIRE DOOR AND ATTACHMENT.—No. 680,369. Aug. 13, 1901. F. L. Bates, San Francisco, Cal. This invention consists in the construction of a horizontally divided two-part door, the lower part of which opens about a vertical hinge on one side, and the upper part opens downwardly about horizontally disposed hinges upon the lower part, so that the fuel may be introduced through the open upper portion. An inclined guard plate serves to direct the fuel to prevent its catching and turning on the door opening, a horizontal slot on the upper part of the door casing, and an air-deflecting plate serves to direct air into the furnace and assist in the combustion.

STRESS APPARATUS.—No. 680,371. August 13, 1901. H. M. Brittan, San Francisco, Cal., assigned to American Steel & Wire Co. same place. The apparatus is designed for testing wire rope cables and the like to ascertain the breaking strain. It consists of a cylinder and a piston, yokes connected with the cylinder and with the piston, extending in opposite directions, said yokes including arms having turned ends secured respectively to the heads of the cylinder and the piston. The yokes carry devices for the attachment of the rope or part to be tested, and means for indicating the tension upon this part.

New Patents.

DEWEY, STRONG & CO.'S SCIENTIFIC PRESS PATENT AGENCY, 330 Market St., S. F., has official reports of the following U. S. patents issued to Pacific coast inventors:

FOR WEEK ENDING AUGUST 13, 1901.

| |
|-----------------------------------------------------------|
| 680,404.—BOTTLE.—W. H. Aaron, Stockton, Cal. |
| 680,392.—FURNACE FIRE DOOR.—F. L. Bates, S. F. |
| 680,371.—STRESS APPARATUS.—H. M. Brittan, S. F. |
| 680,687.—MANIFOLDING SHEET.—H. P. Brown, S. F. |
| 680,319.—BOTTLE.—S. W. Duram, San Jose, Cal. |
| 680,573.—OIL BURNER.—J. Eastwood, S. F. |
| 680,375.—FRUIT GRADER.—J. W. Fawkes, Sr., Burbank, Cal. |
| 680,456.—AIR BRAKE.—Hickey & Kellogg, Tacoma, Wash. |
| 680,381.—SACK HOLDER.—W. M. & C. C. Inman, Bishop, Cal. |
| 680,364.—BOOT DRIER.—H. C. Mansfield, Chico, Cal. |
| 680,435.—FOUNTAIN COMB.—J. G. McAlpine, Jr., Gilroy, Cal. |
| 680,344.—OIL RACK.—L. K. Moore, Moro, Or. |
| 680,675.—WALIST LINING.—J. Newbauer, S. F. |
| 680,352.—BOX OPENER.—J. C. Patterson, Seattle, Wash. |
| 680,463.—BRACKET.—F. H. Plaistridge, Los Angeles, Cal. |
| 680,353.—PAGE INDICATOR.—R. Scott, North Yakima, Wash. |

Latest Market Reports.

SAN FRANCISCO, Aug. 22, 1901.

SILVER.—Per oz., Troy: London, 27½d (standard ounce, 925 fine); New York, bar silver, 58½c (1000 fine); San Francisco, 58½c; Mexican dollars, 47c San Francisco, 45c New York.

COPPER.—New York: Lake, 1 to 3 casks, \$17.25; carload lots, \$17.00; Electrolytic, 1 to 3 casks, \$16.75; carload lots, \$16.62½; Casting, 1 to 3 casks, \$16.60; carload lots, 16.50. San Francisco: 18. Mill copper plates, 20c; bars, 22@23c. London: £66 5s per ton.

It is reported that the world copper combine, embracing the Amalgamated, Calumet & Hecla, Senator Clark and the Rothchilds, has been finally formed.

LEAD.—New York, \$4.37½; Salt Lake City, \$4.00; St. Louis, \$4.40; San Francisco \$4.90, carload lots; 5½c 1000 to 4000 lbs.; pipe 6, sheet 8½, bar 5½c; pig, \$5.25. London, £11 11s 3d per ton—2.51 cents per lb.

SPELTER.—New York, \$4.20; St. Louis, \$3.75; London, £16 2s 6d per ton = 3.55½c. cts. per lb; San Francisco, ton lots, 5½c; 100-lb lots, 6c.

ANTIMONY.—New York, Cookson's, 10c; Hallett's, 9c; San Francisco, 1000-lb. lots, 10c; 300 to 500 lbs., 11c; 100-lb. lots, 13@15c.

IRON.—Pittsburg, Bessemer pig, \$16.00; gray forge, \$14.00; San Francisco, bar, per lb., 2.65c in small quantities.

STEEL.—Bessemer billets, Pittsburg, \$24; open hearth billets, \$26.50; San Francisco, bar, 7c to 12c per lb.

TIN.—New York, pig, \$27.50; San Francisco, ton lots, 30c; 1000 lbs., 30½c; 500 lbs., 30½c; less, 31c; bar tin, \$3.35c.

QUICKSILVER.—New York, \$51.00 large lots; London, £9 2s 6d; San Francisco, local, \$47.50 per flask of 76½ lbs.; Export, \$45.00.

MAGNESIUM.—New York, \$2.90, \$3.10; San Francisco, \$3.75.

ZINC.—San Francisco, 5½c; slab, 5½c; bar, 7c; zinc dust, N. Y., 8c.

BABBITT METAL.—San Francisco, No. 1, 10c.

SOLDER.—Half-and-half, 100-lb. lots, 19c; San Francisco, Plumbers', 100-lb. lots, 15½c.

PHOSPHORUS.—F. o. b. New York 50@60c \$3.10.

ASSAY LITHARGE.—San Francisco, 10c \$3.10, small lots.

BISMUTH.—New York, \$3.10, \$2.25 50-lb. lots; San Francisco, \$2.50 to \$2.75 25-lb. lots.

PLATINUM.—San Francisco, crude, \$19 \$3.10; New York, \$20.50 per Troy oz.

FERRO-MANGANESE.—Pittsburg, 80%, domestic, \$58.50, large lots.

NICKEL.—New York, 50@60c \$3.10.

ALUMINUM.—New York, No. 1, 99% pure ingots, 35c; No. 2, 90%, 30c to 35c.

POWDER.—F. o. b. San Francisco: No. 1, 70% nitro-glycerine, per lb., in carload lots, 15½c; less than one ton, 17½c. No. 1*, 60%, carload lots, 13½c; less than one ton, 15½c. No. 1** 50%, carload lots, 11½c; less than one ton, 13½c. No. 2, 40%, carload lots, 10c; less than one ton, 12c. No. 2* 35%, carload lots, 9½c; less than one ton, 11½c. No. 2** 30% carload lots, 9c; less than one ton, 11c. Black blasting powder in carload lots, minimum car 725 kegs, \$1.50 per keg; less car lots, \$2 per keg.

CAPS.—3x, \$5.50 per 1000; 4x, \$6.50; 5x, \$8; Lion, \$9, in lots not less than 1000.

FUSE.—Triple tape, \$3.60 per 1000 feet; double tape, \$3.00; single tape, \$2.65; Hemp, \$2.10; Cement No. 2, \$3.00; Cement No. 1, \$2.65, in lots of 3000 feet and up.

CANDLES.—Granite 6s, 16 oz., 40s., 9½c set; 14 oz., 40s., 8½c.

OILS.—Linsed, pure, boiled, bbl., 75c; cs., 80c; raw, bbl., 73c; cs., 78c. Deodorized Stove Gasoline, bulk, 14½c; do., cs., 20½c; 86° Gasoline, bulk, 20c; do., cs., 26c; 63° Naphtha or Benzine, deodorized, in bulk, per gal., 13½c; do., in cs., 19½c; Lard Oil, Extra Winter Strained, bbl., 75c; cs., 80c; No. 1 bbl., 50c; cs., 55c. Neatsfoot Oil, cooper's bbls., 60c; cs., 65c; No. 1 bbl., 50@52½c; cs., 55@57½c.

CHEMICALS.—Cyanide of potassium, 98%-99%, jobbing, 31½@32½c \$3.10; carloads, 29@30c; in 10-lb. tins, 40c; sulphuric acid, in carboys, 66½ B, 2c \$3.10; soda ash, \$1.90 \$3.10 100 lbs.; hyposulphite of soda, 2½@3c \$3.10; blue vitriol, 5½@6½c \$3.10; borax, concentrated, 7@8c \$3.10; chloride of potash, 12@13c; roll sulphur, 6c; alum, \$1.90@2.00; flour sulphur, French, 2½@2½c; California refined, 1½@2c; nitric acid, in carboys, 8c \$3.10; caustic soda, in drums, 3½@4c \$3.10; Cal. s. soda, bbls., \$1.00; sds, 95c \$3.10 100 lbs.; chloride of lime, spot, \$2.50@2.60; nitrate of potash, in kegs, 8c; caustic potash, 10c in 40-lb. tins.

COAL.—San Francisco, coast, yard prices: Wellington, \$9; Seattle, \$7.00; Coos Bay, \$5.50; Southfield, \$9.00. Cargo lots, Eastern and foreign: Wallend, \$8.00; Brymbo, \$7.50; Pennsylvania, hd., \$14.00; Scotch, \$8; Cumberland, \$12; Cannel, \$9.50; Welsh Anthracite, \$12.00; Rock Springs, \$8.50; Colorado Anthracite, \$14.50. Coke, \$16 per ton in bulk; \$18 in sacks.

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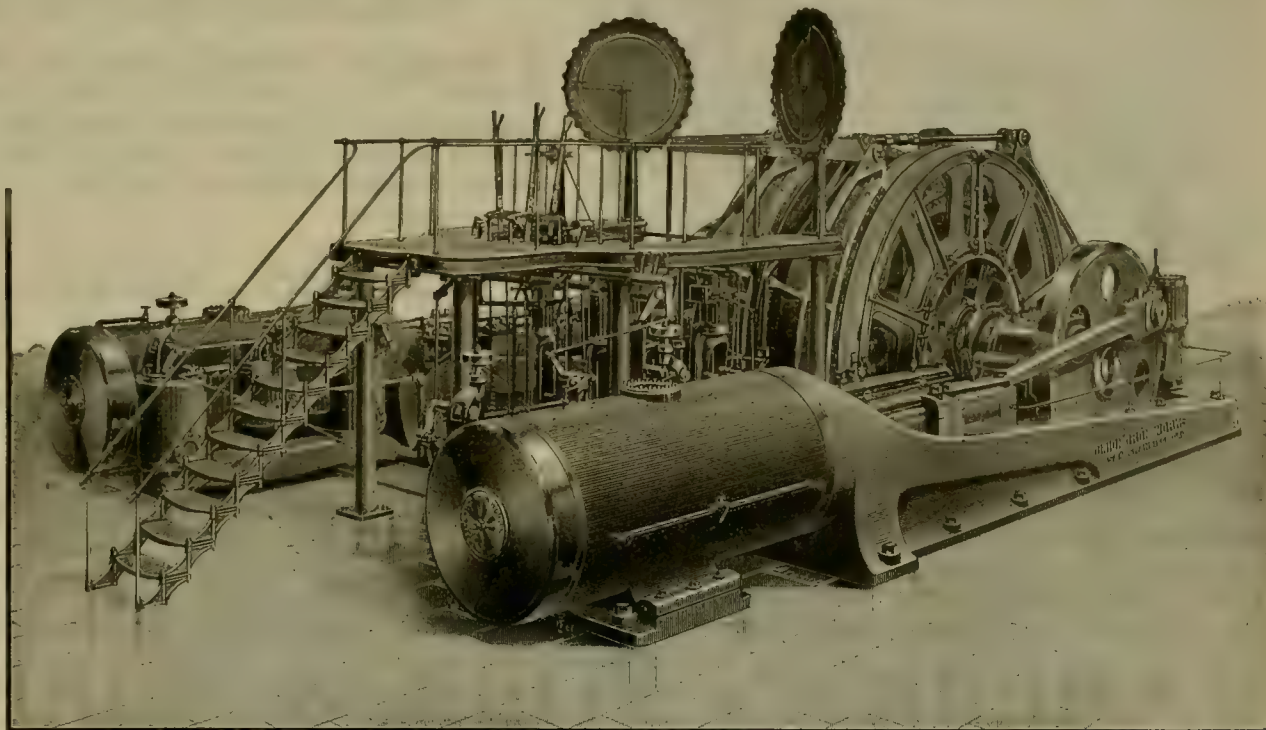
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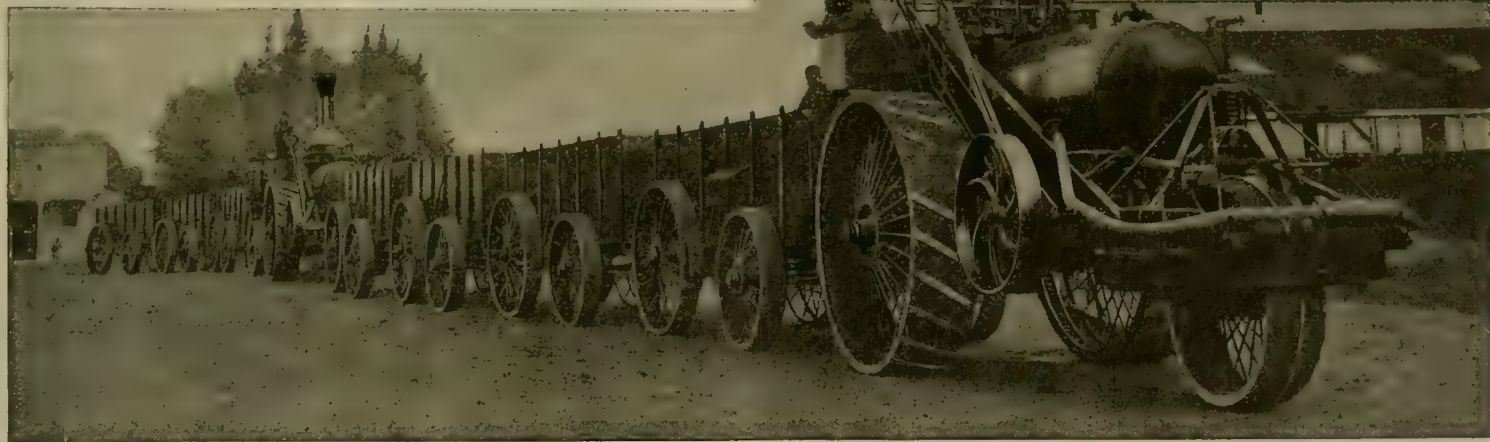


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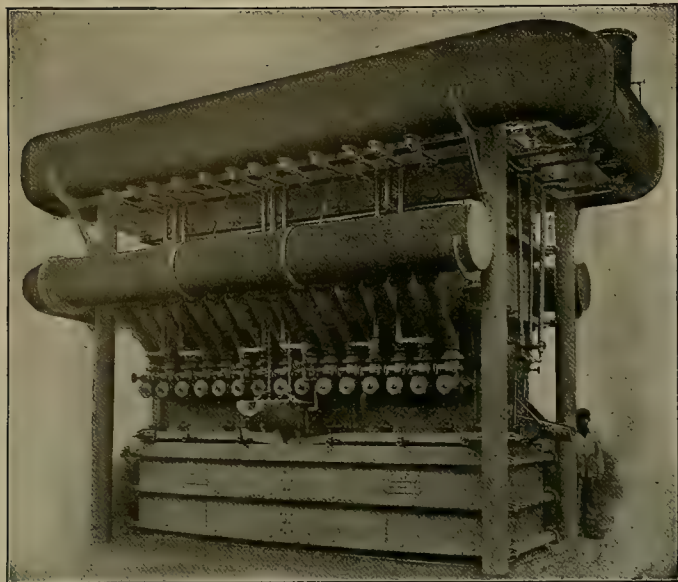
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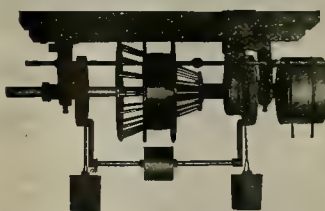
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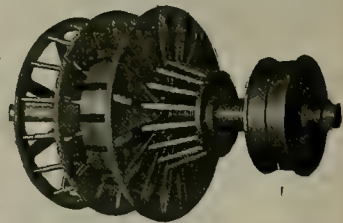
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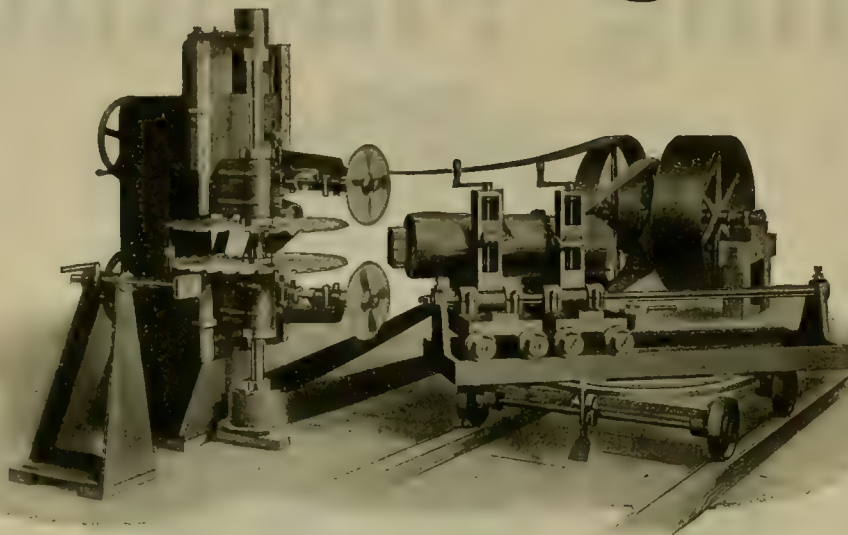
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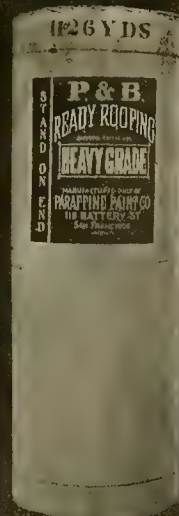
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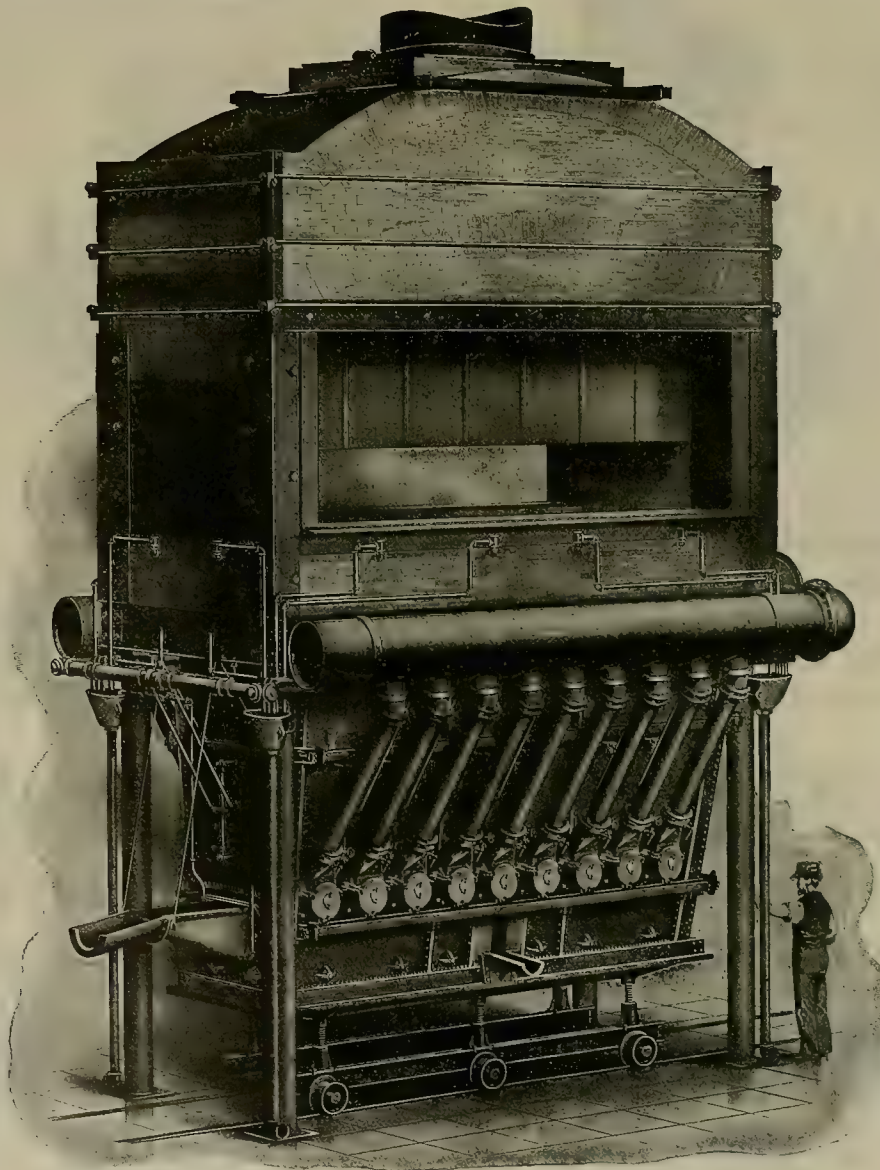
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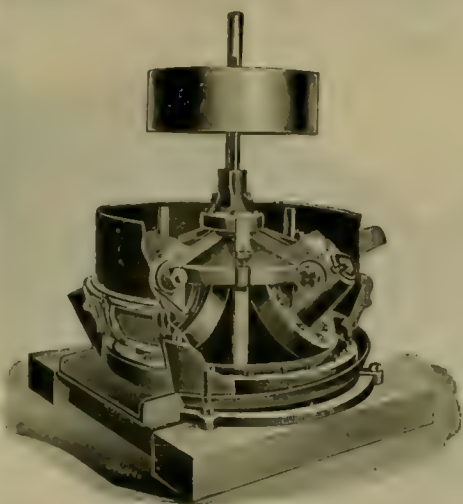
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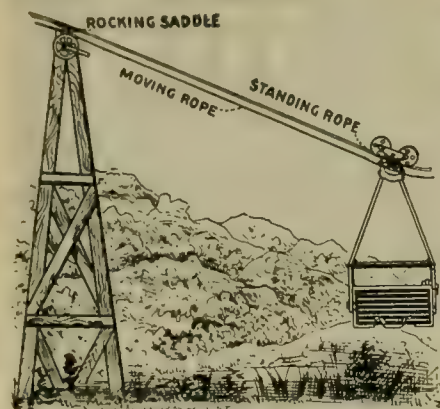
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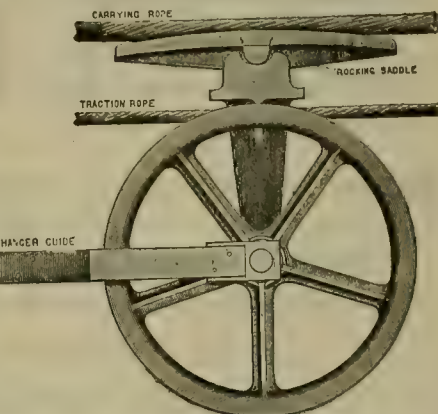
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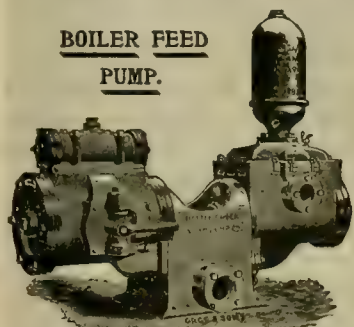
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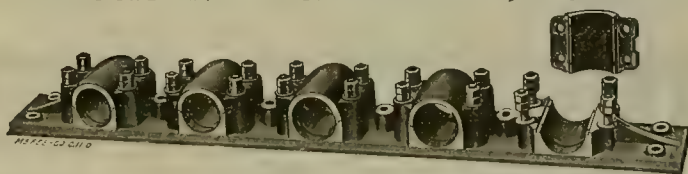
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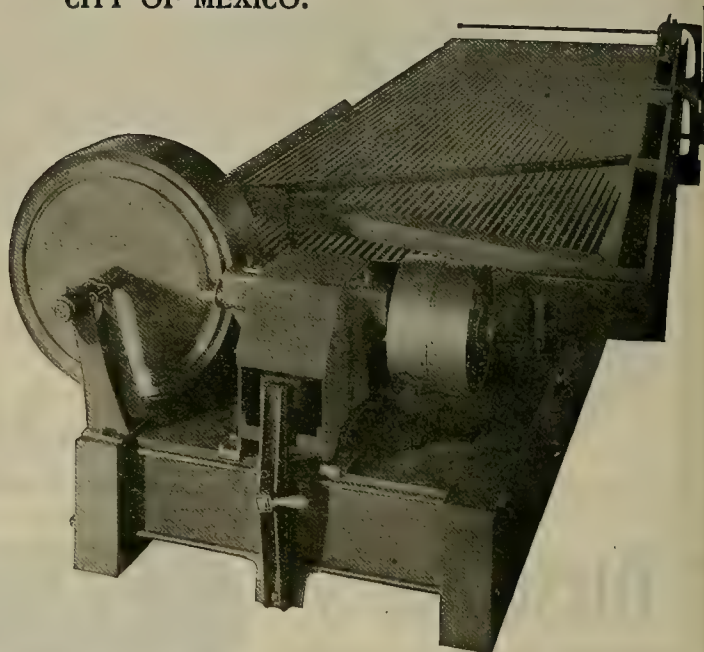
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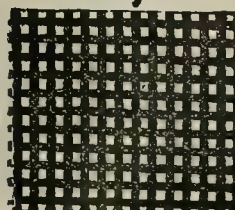
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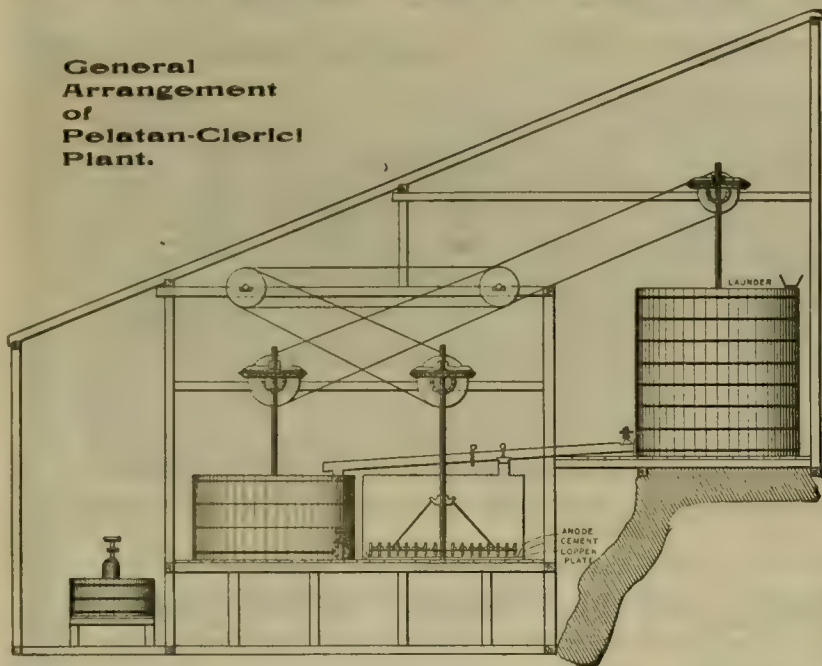
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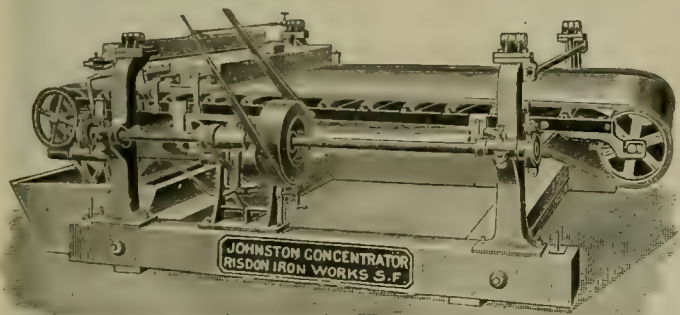


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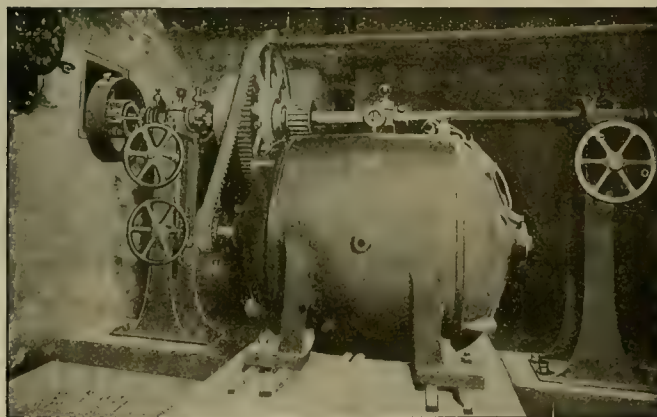
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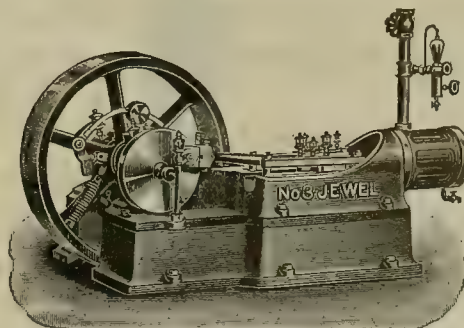
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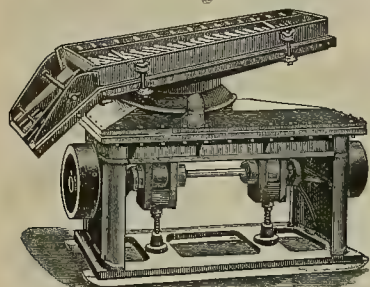


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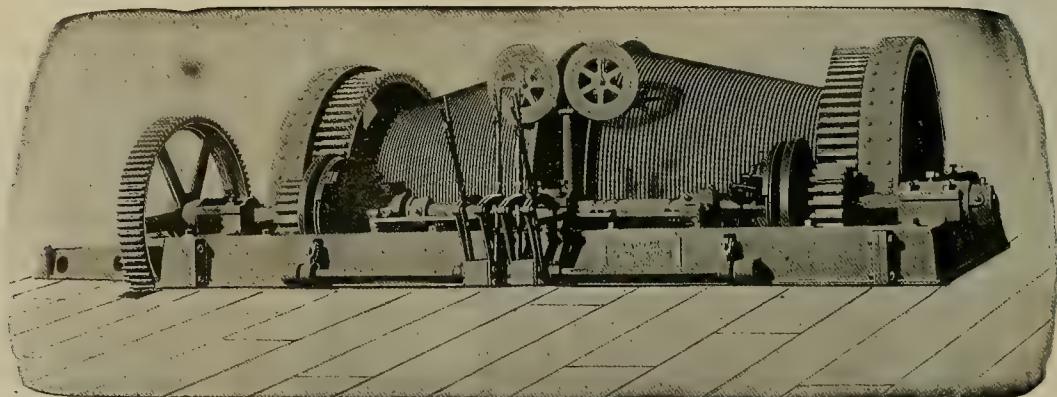
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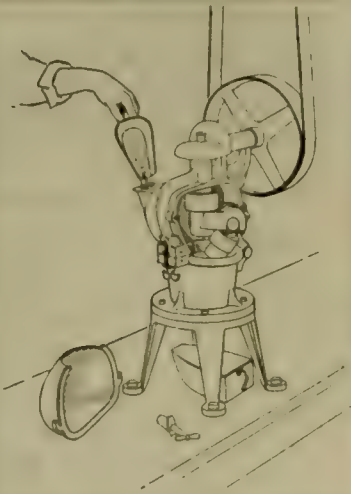
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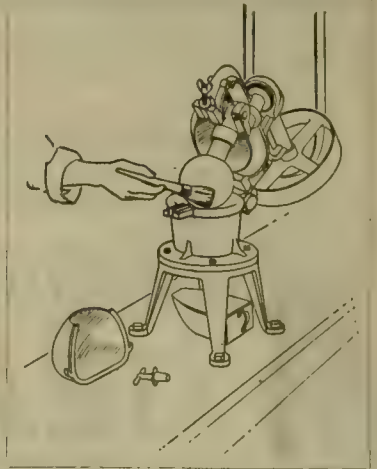
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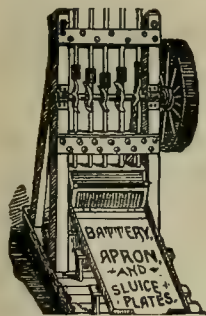


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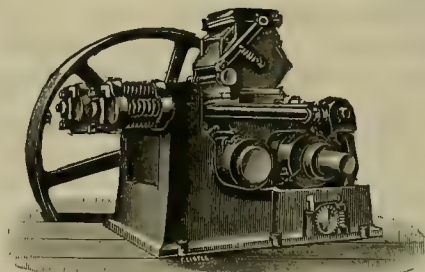
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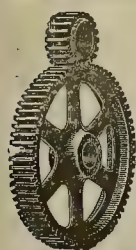


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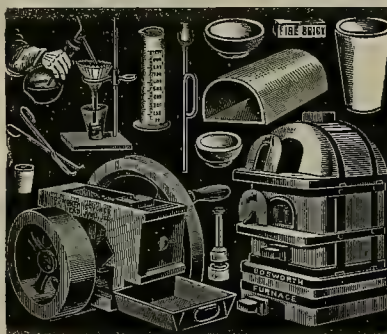
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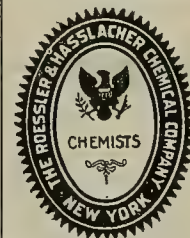
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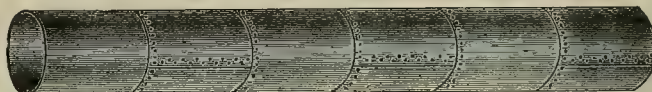
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Notice: There are delinquent upon the following described stock on account of assessment (No. 19) levied on the 31st day of July, 1901, the several amounts set opposite the names of the respective shareholders, as follows:

| Names.                      | No. Cert. | No. Shares. | Am't.    |
|-----------------------------|-----------|-------------|----------|
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| Schneider, T. C.....        | 304       | 30          | 3.00     |

And in accordance with law, and an order from the Board of Directors, made on the 31st day of July, 1901, so many shares of each parcel of such stock as may be necessary will be sold at public auction at the office of the company, Rooms 113-114, Crocker Building, San Francisco, California, on MONDAY, the 24th day of September, 1901, at the hour of 2 o'clock P. M. of said day to pay delinquent assessments thereon, together with cost of advertising and expenses of sale.

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Notice is hereby given, that at a meeting of the Board of Directors, held on the 13th day of August, 1901, an assessment (No. 3) of three cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, Room 31, Claus Spreckels Building, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 31st day of September, 1901, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 14th day of October, 1901, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

EDWARD H. STEARNS, Secretary.

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Any stock upon which this assessment shall remain unpaid on the 15th day of August, 1901, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 24th day of September, 1901, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

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GEO. W. DIXON, Secretary.

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## POSTPONEMENT.

The date of the delinquency of the foregoing assessment (No. 3) has been postponed to THURSDAY, the 29th day of August, 1901, and the day of sale from the 24th day of September, 1901, to MONDAY, the 16th day of September, 1901. By order of the Board of Directors.

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Notice is hereby given, that, at a meeting of the Board of Directors, held on the 23rd day of July, 1901, an assessment (No. 3) of One Cent per share was levied upon the capital stock of the corporation, payable immediately in gold coin, to the secretary, at his office, 55 Steuart street, San Francisco, California.

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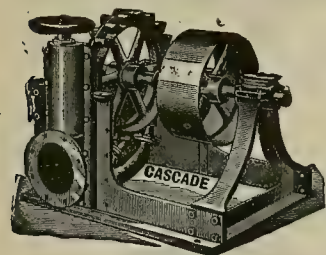
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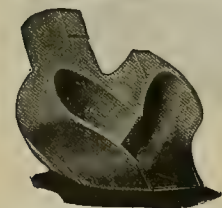
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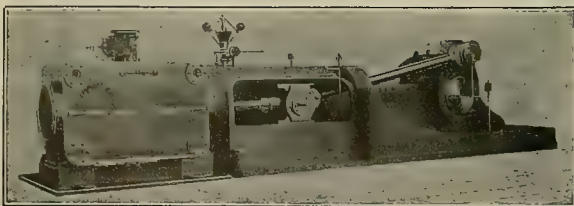


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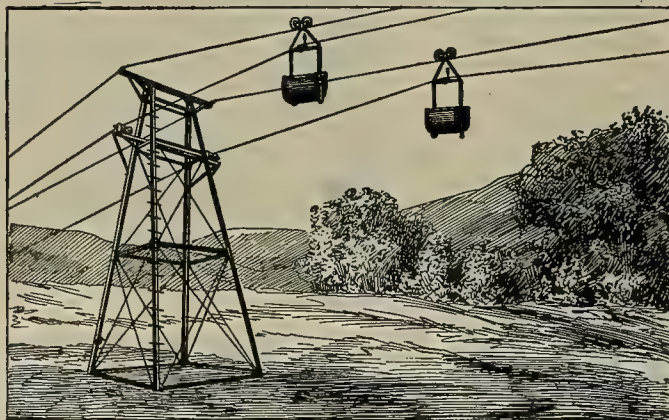
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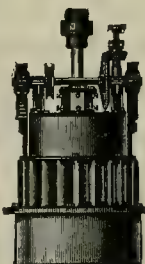
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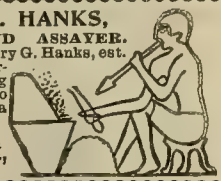
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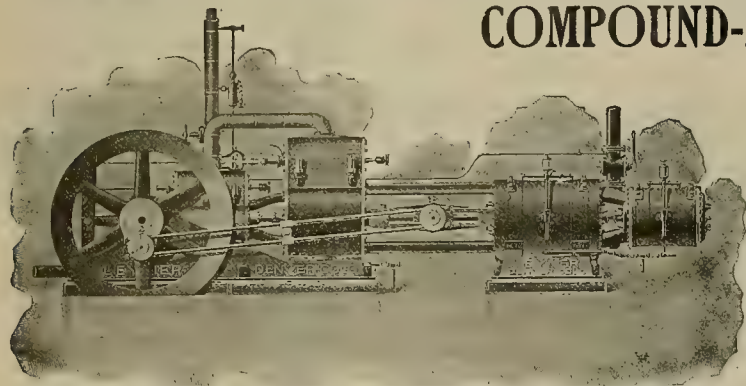
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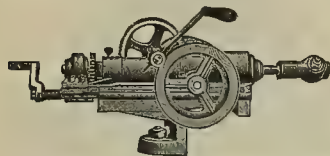
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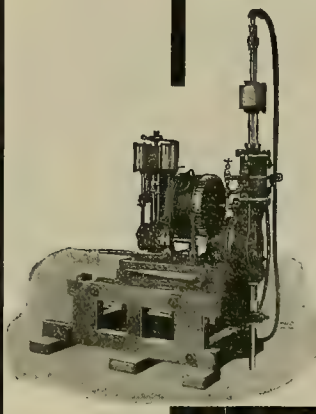
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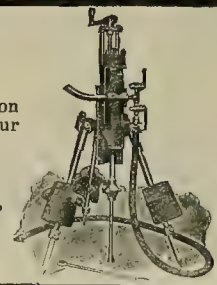
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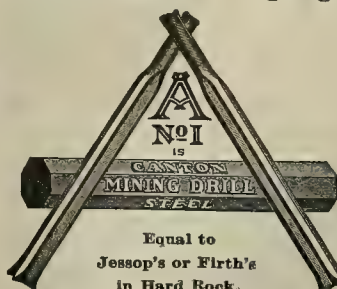
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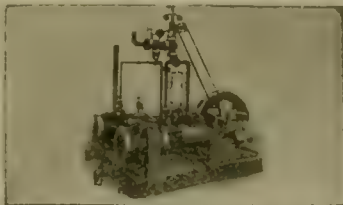
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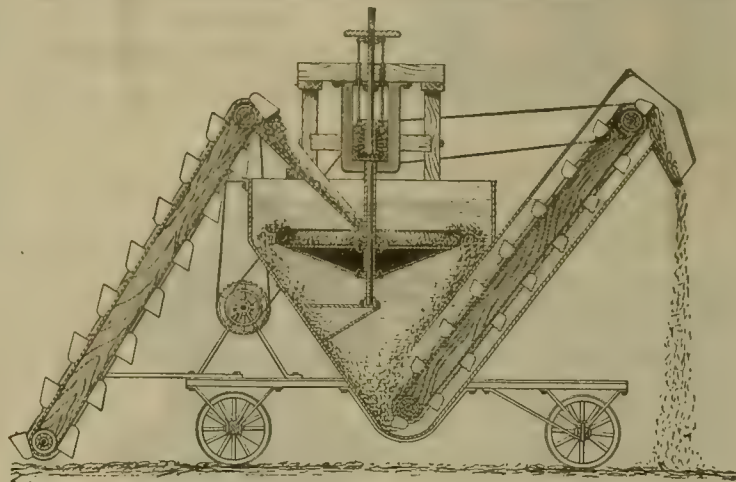
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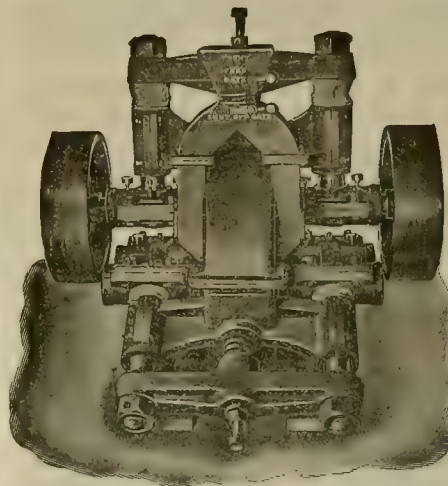
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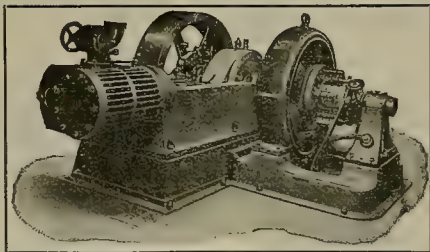
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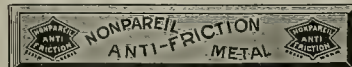
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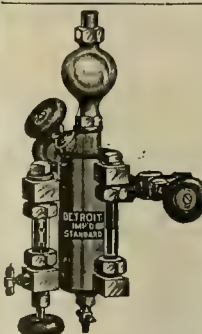
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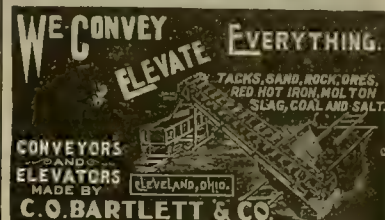
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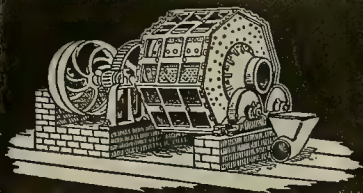
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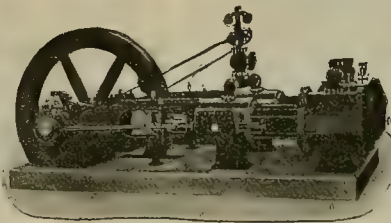
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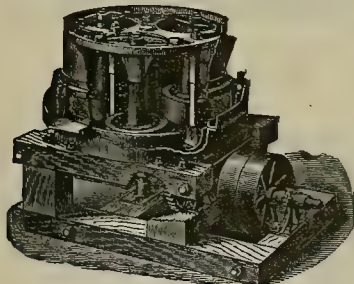
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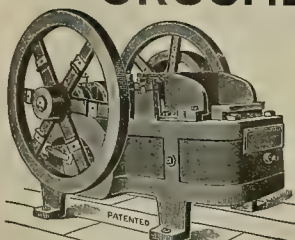
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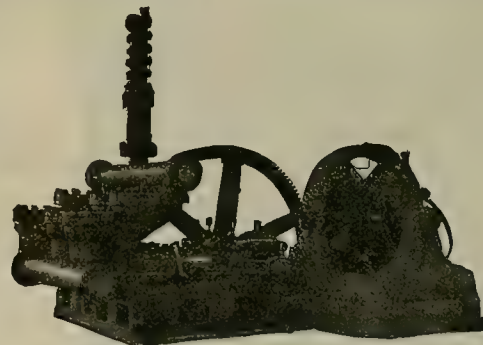
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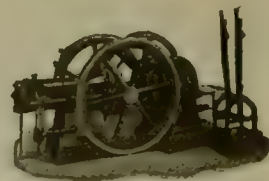
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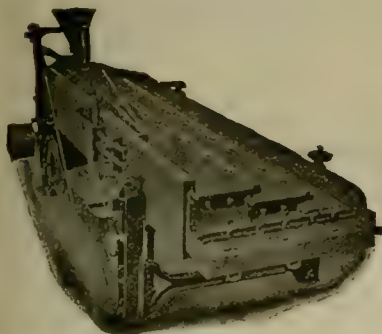
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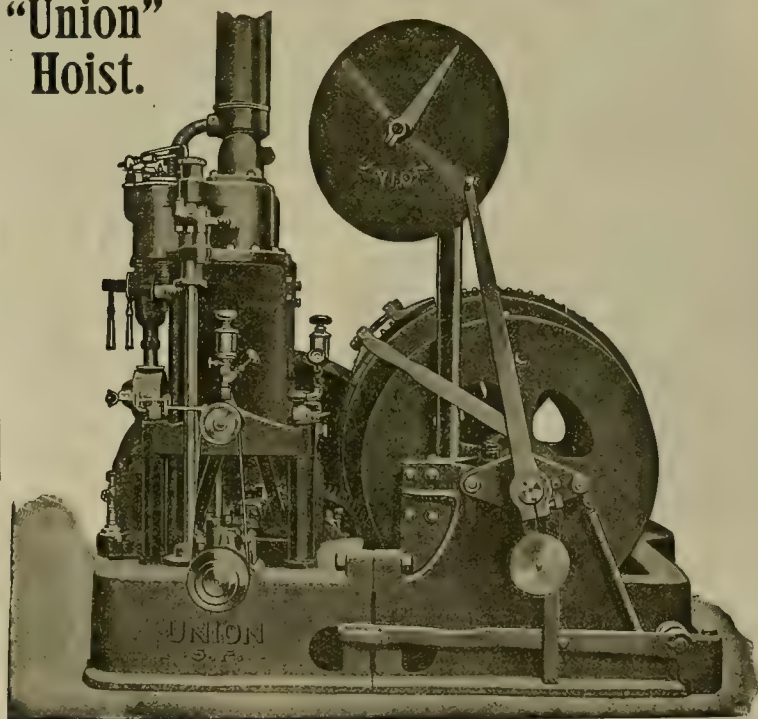
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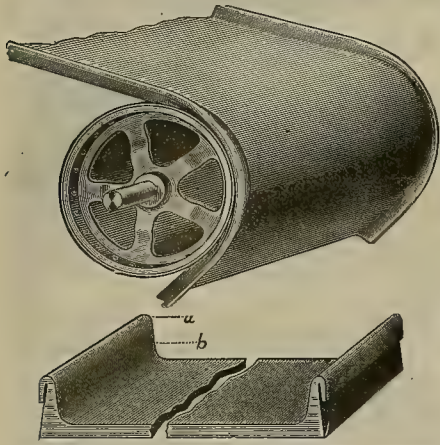
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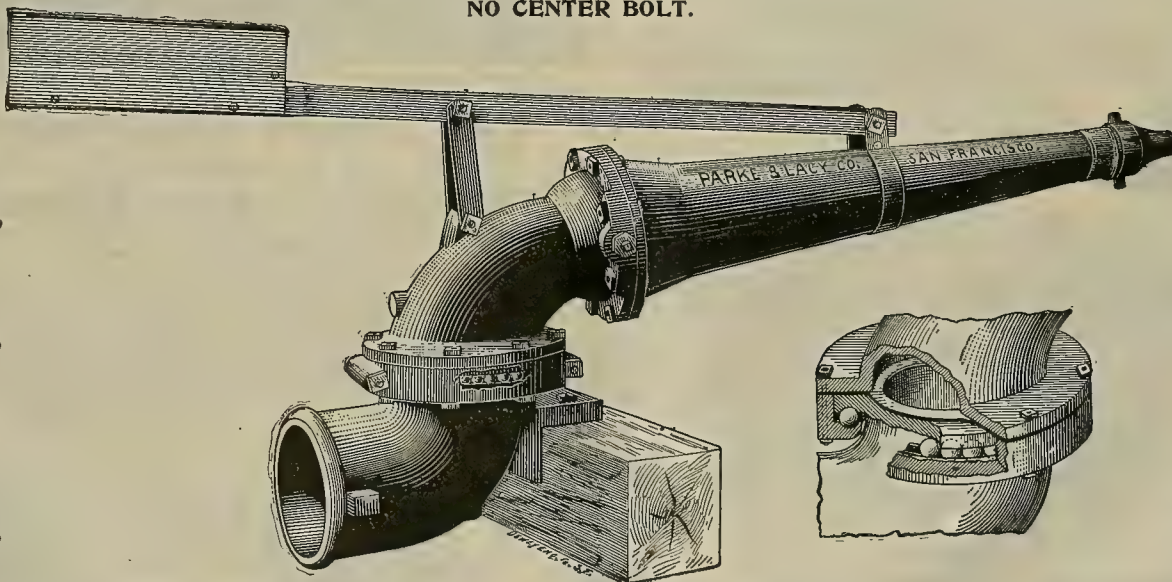
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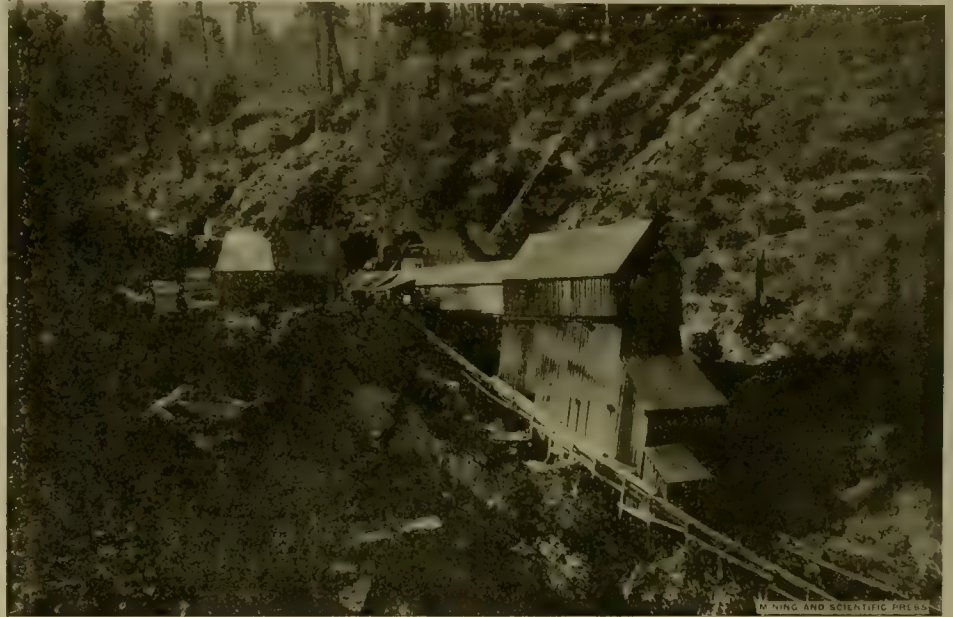
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With the industry of gold mining, separate by itself from other metal mining, the paying from the gold production of the transportation costs is clearly apprehended. With other metal mining the idea that part at least of the transportation costs is paid by the consumer would, on first statement, seem so reasonable that it would be accepted as true. An analytical consideration of the proposition, however, demonstrates that it is untrue, and that the producer pays all of the transportation costs. With silver the production pays the transportation costs, as the sale price is fixed by the general commercial trade conditions of India and China, which have absolutely nothing to do with the mining. With lead, copper and zinc the transportation costs are also paid by the production. The sale price is fixed by a combination of producers. The consumer must pay what the combination asks for these metals or do without. From the standpoint of one in the combination the freight is paid by the consumer, but the outside producer cannot so regard it. He cannot add to the other cost items the total of transportation charges and then add his profit to make a selling price. He must, if he would do business, first deduct from the selling price the transportation cost, and make the remaining costs aggregate a less sum than what remains of the selling price after the deduction.

While not the fact to say that the transportation cost is not considered by the average mine operator,

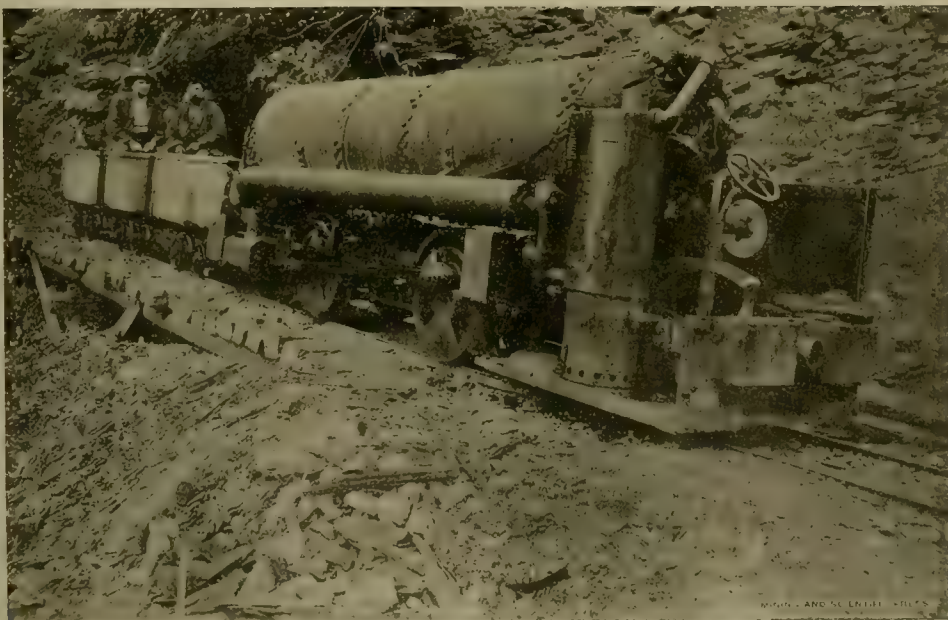


Mine Buildings and Plant at Tunnel Entrance, Red Point Mine, Placer County, Cal.

it is the fact that it is seldom taken into account at the beginning of the enterprise, and even less rarely given consideration by analysis in detail. It is the purpose of these lines to suggest to mine operators to make an analytical examination of the transportation cost their metal production is paying; and, also, where the business is yet in the projection stage, contemplated but not established, to suggest the making of an estimate of transportation cost with the same care and to the same detail that the examination of ore values is made. Some mine operators have done this, and limited as are the opportunities left by the community of interest in the transportation business for the mine business management to make economies, these operators have made economies productive of increased profit to them.

Where cost keeping has been made a part of the mine business, transportation has been carried in not more than two accounts, and sometimes in only one. In the latter case, independent of the actual incidence of the charge, whether from construction, mine operation, or ore or metal reduction, and selling, it is lumped as freight. Where two accounts are kept, one is for freight charges on everything coming to the mine; the other, on ore or metal leaving it. A third one, if kept, deals with the cost of transportation of the ore in the mine. This last has, in distinction from the others, received close attention, and economies have been successfully made by proper constructive use from the facts disclosed by the cost account. In some systems of mine accounting, freight or transportation cost is split up on the vouchers into parts, which are direct charges against other cost items in the accounts and added to these other costs, the sum only being entered. This is a closing out of the transportation costs from the accounts altogether. Also, the practice has developed, through the ore reduction works paying the charges to the carrier from the metal yield of the ore reduction, of one charge being made by the reduction works which is directly inclusive of the transportation charge and the reduction charge on the ore, and indirectly inclusive of the transportation and selling costs of the metal from the reduction works to the consumer.

With the general accounting practice directed to covering up and concealing the facts as to transportation costs, the beginning of their analysis is not a simple matter. It can only be simplified by changing the system of accounting so that the mine business accounts do show the facts. There should be no arbitrary limitation on the number of subtransportation cost accounts. Two general divisions or groups should be made. The first includes the transportation costs which are part of the investment in plant or its maintenance during its life. These are capital charges. The second includes all the transportation costs of current operation, and in keeping them there are many subdivisions that are necessary to intelligent use of the data.



Compressed Air Locomotive, Red Point Mine, Placer County, Cal.



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REPORTS from Dawson now indicate that the gold output of the Klondike for this season is much less than the estimates. It is doubtful if the total will exceed \$15,000,000 where not less than \$25,000,000 was looked for. In the light of the actual figures for this year it seems probable that last year was the banner year for this district. There is nothing surprising in the rapid exhaustion of the cream of the placer deposits. It has been simply another instance of what has happened in every other placer camp in the world. The cleaning up of the cream of the gold deposits does not by any means imply their exhaustion or that the Klondike is not a good country for mining any longer. As a matter of fact it is probable that the aggregate of profit over the flat cost of mining from the gold that will yet be taken out will exceed the sum already obtained as profit over the cost of production. What gold has so far been obtained has been obtained under cost conditions which are now ended. From now on economical mechanical methods and appliances for mining will come into increasing use as substitutes for the costly hand labor heretofore so largely employed. The first worked areas will be reworked for ground missed by haste and lack of knowledge of where to mine. The relatively poorer deposits that could not be worked before will now be made profit earning. The Klondike country is still good for extended placer mining for some years to come, though the period of phenomenal yield has undoubtedly passed.

THERE is a class of misnamed mining stock exchanges the establishment of which should be discouraged by any community. From the beginning they are intended, primarily, for the purpose of making what are called quotations to influence the sales of stock in localities so distant or unsuspicious that the quotation will be accepted as bona fide. A number of mines are incorporated and the promoters living in the same city establish the so-called mining exchange. At the same time their agents are out canvassing to make sales of the stock. The promoters meet every day and make wash bids and sales between themselves. These quotations are always higher. They are wired to the agents, who use them to induce investment on the theory that there is an active home market for the stocks, and that the mines must, therefore, be good. No bona fide sales are made. If the attempt is made to sell against a bid the transaction is never closed by payment of the money except under threat of a criminal prosecution. Such so-called mining stock exchanges are exceedingly harmful in their effects. They hurt the business

reputation of the community that permits them to exist, and they hamper instead of help the development of the mining industry, which directly or indirectly contributes to the support of the community. A mining exchange legitimately conducted is, on the other hand, a help both to mining development and to a community. The quotations made from actual sales mean what they say. They measure exchange market values from day to day and keep buyers and sellers in constant touch. The very freedom of exchange and the quick response in stock value that a genuine mining development gets through a legitimate exchange brings far more money into the business than would otherwise be likely to come. While investors can guess wrong in the legitimate exchange, and are compelled to pay for their guess, the game is fair—for it is possible, with even chances, to guess right. In the type of so-called exchanges first described the investor has no chance from the beginning. The so-called game is fixed in advance for the promoters, who make it to do all the winning.

## Nickel Mining in the United States.

The owners of a mine in Washington containing ores of nickel and cobalt are reported as saying that they are unable to commercially operate their mine, because the only nickel smelting and refining establishment in the United States refuses to buy or reduce their ore. The owners of the smelting plant are, however, it is further reported, willing to buy the nickel mine. The New York selling price for nickel at the present time is from 50 to 60 cents a pound, and of cobalt about \$3 a pound. There is a good commercial demand for nickel, but a comparatively small demand for cobalt.

This paper has made the statement that while custom smelters might make a mine they did not make a mining business. The instance here cited is an example that illustrates by an extreme case just what was meant by the statement. The nickel mine is made in the sense of having an ore body sufficient in quantity and sufficiently rich in commercially salable metal to pay all mining, transportation and reduction costs and leave a profit which would repay the owners for the use and risk of their capital. But the custom smelter refusing to reduce the ore there is no metal to sell and, therefore, no mining business. The same thing could be as truly said if, instead of refusing to buy or reduce the ore at all, a price had been offered, or charge made, that left to the mine owner only his flat costs of mining and transportation.

The situation for the nickel mine owners is a condition; for the owners of the smelting monopoly it is merely a point of view. The condition requires of the mine owners either (1) the sale or treatment of their ore by foreign smelters, or (2) the construction and operation of their own reduction works, or (3) selling the mine to the owners of the smelting plant at the price they are willing to pay.

The first of these carries with it such additional transportation costs that the cost of the unit of metal produced is materially increased at the expense of the margin of unit of profit. The ability of the new mine production to compete in sale price with existing production is thereby lessened and the value of the mine diminished. Further, there is no guarantee but that the nickel smelting monopoly will become inclusive of the foreign establishments.

The second involves the installation of a costly plant and a technically difficult process to operate as compared with other metal reduction plants. There is an economic minimum to the size and capacity of a plant for the reduction of nickel and cobalt ores. Below this economic minimum the unit cost of metal production would increase rapidly. The selection of the best process for the particular nickel ore is also somewhat uncertain without the guidance of comparative treatment tests under commercial conditions.

The third, selling the mine to the owners of the smelting monopoly at the latter's price, is precisely what the mine owners do not want. The possibility of such a conclusion to an investment of capital would never have induced the investment of capital. In its essence, the owners of the mine are being deprived of what is their property, by the owners of the smelting monopoly operating within the recognized limits of business and industry, exactly as if the mine owners were the men in the stagecoach and the

owners of the smelting monopoly were the men on the lonely roadside with the guns and the drop.

The situation, merely a point of view to the owners of the smelting monopoly, is this: The nickel consumed in the United States comes from the Sudbury deposits in Canada. The total of it is one-half the world's production. The smelting monopoly in the United States has a monopoly of the Sudbury nickel production in the United States. By the use of that monopoly the market price of nickel, which was 20 cents a pound in 1895 and 24 cents a pound in 1898, is now 50 cents a pound. At the same time there has been an enormous increase in consumption. The average nickel and copper content of the ores mined and reduced during this period remained constant. The smelting monopoly has successfully taken to itself all the added profit from the increased price, none of it being lost through the higher unit costs of production which would come from the extension of the mining to ores containing a less metal content. The smelting monopoly has all this existing profit and supplies the demand. It cannot be expected to desire either to divide the total of the profits or to reduce the existing unit profit. To it the new mine offering ore and not metal to the market only makes a spectacle but does not create a condition. Offering to buy the mine is a concession to a possible future condition, not demanded to satisfy the point of present view. It is not forced on the smelting monopoly to offer to buy the mine now.

The situation of the nickel mining industry in the United States is an existing example illustrative of what this paper has indicated the lead-silver mining may become. The high sale price of nickel has led to a closer prospecting for it throughout the United States. It has been found in Washington, in Oregon, at several points in Nevada, and a discovery is reported on Prince of Wales island, Alaska. Dependence on a smelting monopoly which will not reduce the ores these discoveries are commercially worthless. Dependence of the lead-silver mining on a smelting monopoly will tend to make the mine commercially less valuable. It would likely make them as commercially valueless as the nickel deposits if it had the same opportunity of which the nickel smelting monopoly has taken advantage.

There is, as well as a point of view, a point of policy for the smelter monopoly which would seem worth considering. The smelter monopoly can say to the United States nickel miner, "What are you going to do about it?" As between the smelter monopoly and the miner, the preceding shows very little for the miner to do about it, and that little very hard to do. In the end perhaps the best would prove only the obtaining of a higher price for the mines from the smelting monopoly.

But there is a third party that, in this particular case, certainly has a right to be considered, accompanied with the possession of the power to enforce it. The people of the United States, by its National Government, are the largest consumers of nickel. It is a constituent of armor plate and ordnance. The people also by the National Government own the nickel deposits in the United States. The largest single element of cost in the nickel steel armor plate is the nickel. This nickel, produced at a unit cost if anything less in 1901 than in 1895, is bought by the Government in 1901 at two and one-half times the price it paid in 1895. It would not have to continue paying this advance in price to nickel producers, least of all to foreign nickel producers, if its own deposits of nickel in the United States were mined by its own citizens.

The price paid for nickel steel armor plate has become a chronic public scandal. Suppose that, recognizing the cause of this to be largely in the cost of foreign mined nickel, Congress instead of fighting the armor plate manufacturers should offer a price for nickel mined in the United States and furnish that to the armor manufacturers, just as it now provides the armor to the builders of the warships. It might also give nickel mining the help of a duty to enable the industry to establish itself against the foreign production.

It would seem that, preferably to risking the intervention, in establishing the price of nickel, of the people who pay the price whatever it is and however fixed, the policy of the smelting monopoly should be to concede some of the present profit to miners in the United States.



## Concentrates.

THE mineral zircon is very common in occurrence. It has no commercial use or quoted sale value.

STEEL is so homogeneous in its structure that internal flaws are exceedingly uncommon. This is not the case with wrought iron, which is liable in any piece to contain a hidden flaw.

COPPER ORES have been shipped from British Columbia to Swansea, Wales, at \$5 a ton. It is stated that sulphurets in sacks from Juneau, Alaska, to Tacoma, Wash., have been carried for \$1.25 per ton.

INJUNCTIONS issued against the copper smelting works at Ducktown, Tenn., on the suits of farmers who claimed damage from sulphur fumes have been dissolved and the companies allowed to resume work pending a final decision.

MORE than two-thirds of the entire production of copper in the United States is refined electrolytically. About 16,000 electrical H. P. are consumed producing 580 tons of refined copper daily, and 51,800 ounces of silver and 491 ounces of gold are recovered as by-products.

THE United States District Court, in the suit of Joseph R. DeLamar, owner of the Waldestein patent for the precipitation of gold from cyanide solutions by zinc dust, for infringement of the patent, against the DeLamar M. Co., at Silver City, Idaho, has decided that the patent is invalid.

A DEPUTY SURVEYOR, surveying a mining claim for patent, must keep within the boundaries established by the location monuments. He is not permitted to extend the lines and establish corners outside of the location corners even if there is no conflicting claim to the additional land so included.

THE Canadian Province of Ontario has a law under which nickel ores mined pay \$10 a ton royalty or \$60 a ton on the nickel contained in them if they are partially treated or reduced, and copper-nickel ores pay \$7 a ton or \$50 a ton on the metal if partly treated or reduced. The law has not been enforced yet.

COAL is now regularly mined in the Canadian Yukon and sold at Dawson and Circle City in large quantities for fuel. A mine is operated on Cliff creek, 60 miles below Dawson, and is connected with bunkers on wharfs on the Yukon by a tram line. The seam is said to be 8 feet thick opened by four tunnels. The production in 1900 was 3000 tons.

THE nickel ores of New Caledonia as shipped from the island contain between 7% and 8% of nickel. It has been computed that the ore could be reduced at the mines and delivered at market points with cost charges against it totaling about 12 cents a pound. Ore that did not contain so large a percentage of nickel could not be reduced to metal at so low a unit cost.

A MINING LOCATION properly made as to posting of notice and marking of boundaries, but void by reason of no discovery of valuable mineral having been made, is made a valid discovery by a subsequent discovery of the valuable mineral, provided no rights of third parties have intervened. Another locator by making the discovery would be a third party whose right intervened.

A COMMON METHOD of detecting unsoundness in cement—that is, cracking or distortion under setting—is to make small cakes or pats of neat cement, about 3 or 4 inches in diameter and  $\frac{1}{2}$  inch thick in the center, thinning towards the edges, upon plates of glass, and keep them in air or water for a few days. If these pats show any signs of distortion or surface cracks, it is taken as an indication towards distortion.

THE sulphur in coal occurs both in pyrite and in organic matter. The iron occurs practically entirely as pyrite. To determine the proportions of sulphur in the two forms, calculate the quantity of sulphur necessary to satisfy the iron as pyrite. The difference between the quantity of sulphur calculated for the iron and the total quantity as shown by the proximate analysis is the amount in organic combination.

SMELTING CHARGES are based ordinarily on what are termed neutral ores—ores in which the percentages of iron and silica are about equal. Some smelters deduct 10 cents for each unit per cent of iron in excess of silica and add 10 cents for each unit of excess of silica over iron. Thus the charge for a neutral ore being \$6 a ton if it contains 10% more iron than silica, the charge would be reduced to \$5 a ton; and if it contained 10% more silica than iron, the charge would be \$7 a ton.

CHROME IRON ORE is not at present mined in California. The ore formerly mined went by sailing vessel to Baltimore, Md., and was used for the manufacture of chromium salts. It is too impure, particularly in silica, for the making of ferro-chromium in the electric furnace. The silicon is reduced and enters the alloy. When mined in California it paid nothing but wages to the men employed. Freight by rail and ocean absorbed the larger part of the sale price. Ocean freights are higher now than then.

THE sectional or public land survey plats of townships and sections give very little reliable information about the topography of the land purported to be surveyed. Much of the surveying was done by sketching the country as it appears from some high elevation in the vicinity. The topographical survey maps made by the U. S. Geologic Survey do give the topography with a high degree of accuracy. The 500-foot contours are run out

in the field and the intermediates of 100 feet are interpolated. Where the topography is flatter, the 100-foot contours are sometimes surveyed out in the field and 25-foot contours between interpolated. The plats satisfy the engineering requirements of accuracy for preliminary projections of roads and ditches. They can be bought from the director of the U. S. Geological Survey at Washington, D. C., for 5 cents a sheet. The exact sum should be remitted by postal order.

THE tempering of drill steel for any particular rock is practically a matter of cut and try—that is, keep trying different tempers until the temper is found at which the drills stand best. The hardness in the mineral scale is not by itself a sufficient guide. The cut of the drill is made by impact where the hardness in the mineral scale of hardness is determined by the effect of applying pressure. Very hard minerals are frequently very brittle and break up under impact, while some soft minerals are tough and resistant under impact.

THE cost per ton of ore mined and stamped and the cost of the copper produced for smelting and selling at the Atlantic mine, at Houghton, Mich., was \$1.78; at the Franklin mine, \$2.41; at the Osceola, \$2.28; at the Quincy, \$3.44; at the Tamarack, \$3.36; at the Wolverine, \$2.46. The cost of the copper produced, including marketing expenses, was: At the Atlantic, 14.8 cents per pound; Franklin, 17.9 cents; Osceola, 13.92 cents; Quincy, 13.63 cents; Tamarack, 11.41 cents; Wolverine, 9.67 cents. The figures are for the 1900 production.

THE cost of producing copper by the Greene Con. C. Co. at La Cananea, Sonora, Mexico, is stated officially by the company to be in detail as follows: Cost of mining, \$0.91 per ton; cost of smelting to matte, \$2.14 per ton; hauling from mines to smelter, \$0.15; total, \$3.20 per ton of ore. Production of copper per ton is 159 pounds, or \$0.0201 per pound. Freight on matte to New York \$12 a ton, \$0.012 per pound; \$5 a ton, or \$0.005 per pound, for bessemerizing; sales commission \$0.005, refining \$0.0025 a pound, making a cost charge total of \$0.0446 per pound.

STOCK in a mining corporation that is non-assessable is not any more desirable as an investment from that fact. The non-assessable provision is paid for by the owner and generally at a high rate. If the mine turns out well, the promoters who insured the non-assessable feature get the lion's share of the mine profit as pay for that insurance. If it is a failure, it is just as much a dead loss as if it were assessable, and if, as it usually happens, it requires more capital than the promoters estimated, there is no means of providing it from the existing stock ownership.

IN the construction of the Bay Counties flume line, to take water from the North Fork of the Yuba river in Yuba Co., Cal., to the power plant, the different varieties of native woods were employed as follows: All sills are made of heart cedar; posts and caps are made of heart yellow pine; bottom and side boards are made of heart sugar pine or heart yellow pine; battens are made of sugar pine and underpinning and trestle bents of heart red spruce. No sapwood is used at all. All scantlings are seasoned before using, but bottom and side boards can be laid in place green from the saw.

CONCRETE can be made successfully in very cold weather. The materials should be heated, the stone as well as the sand, cement and water. The concrete, while setting, should be protected from freezing. This is done by housing over the forms and heating by stoves. The concrete bridge piers of the Transiberian Railway, in the Transbaikalian division, were built in winter with the temperature 20° F. to 30° F. below zero, by housing in the work. In that extreme cold it was found practicable to go down through the ice of shallow streams and excavate the beds to solid foundation for the piers, without having to handle water.

THE current accepted idea regarding the frictional resistance to flow of water through bends or turns in pipe is that the frictional resistance and consequent loss of head increased rapidly with the shortening of the radius of the turn. The text-books have recommended that where it was desirable to avoid loss of pressure and flow, the bends should be made with a radius not less than five times the radius of the pipe. The correctness of the idea and the soundness of the advice are now questioned by some American engineers, who advance almost precisely the opposite, claiming that their carefully carried-out experiments show that curves of short radius show less frictional resistance to flow than curves of longer radius.

NATURAL CEMENT CONCRETE has been used for the main body or core of the mass of a structure, with a Portland cement concrete for the facing. Instances have been given, however, which indicate that it is difficult to make a thorough bond between the two classes of concrete, and that there is liable to be a line of separation between them. Natural cement may be used in foundations, etc., but for walls, or other exposed work where Portland cement is to be used, it is considered better to use this cement throughout. Economy may be effected by using a poorer mixture of concrete for the interior of the mass, rather than by using a different kind of cement.

THE degree of heat attained by drill steel in forging before tempering may or may not affect the tempering. The forging heat, if it is much higher than the temperature at which tempering begins, may, if it be reduced to the latter too rapidly, set up excessive strains in the

metal, giving it a tendency to check and crack. Also, the temperature may under such conditions be started too soon. The appearance of the surface of the metal to the eye is misleading. The surface, cooling much more rapidly than the interior conduction of heat from the latter to the former during the tempering, may affect it. After all, it is not so much the matter of heat as it is in the matter of controlling it and knowing how it is acting that affects the tempering.

THE iron cap of copper-bearing veins is ordinarily a limonite iron ore, occasionally a hematite and, more rarely, magnetite. In the latter case it would appear that the ore deposit is an enrichment or local segregation of mineral from the fluid or semi-fluid eruptive, and the magnetite an original mineral. Where hematite or limonite, the latter sometimes being known as gossan, forms the capping, it is the result of oxidation of pyrite and chalcopryite, the sulphur disappearing into the atmosphere and the copper leaching out as sulphate, to be reprecipitated about the permanent water level of the ore body. In a region where copper is known to exist it is always safe to prospect into any iron ore croppings that exist in search of copper ores.

THE perpetually frozen gravels of the Klondike are being successfully hydraulicked by first uncovering the gravels so that the sun heat has a chance to thaw them out. The removal of the moss permits the hydraulicking of 2 to 3 feet of muck immediately underlying it. The sun heat then thaws out an additional depth which can then in turn be hydraulicked. The water itself assists the thawing and by distributing the washing over a comparatively large surface it is practicable with a continuous water supply and good dump to clean up a correspondingly large bedrock area in the short Arctic summer. The cost of this work is very much less than methods of drifting employing steam thaws and it has the advantage of working the ground clean.

WHILE wet concrete, even to a degree of slushiness, is used in some cases, general practice and the weight of opinion appears to be decidedly in favor of using concrete pretty dry, and relying upon good ramming to fill the voids, the consistency being such that thorough and hard ramming is necessary to cause water to flush to the surface to show a quaking motion in the mass. One authority, however, states that, as a general thing, excess of water is preferable to an insufficiency, for the reason that the concrete may be laid in a trench in porous soil, which will absorb some of the water, or the materials of the aggregate may be porous and also absorb water, while with a quick-setting cement and a minimum supply of water, there may be danger of the concrete setting too quickly.

IN the manufacture of vitrified brick the shale is first crushed dry, ground and screened, the oversize being returned. For screens, an 8-mesh can be used, but a 16-mesh is preferable. The brick are molded in stiff-mud machines with dies, making end-cut or side-cut brick. A second pressing is frequently given to smooth corners and make the structure denser. A variety of kilns can be used in burning, but the down-draft type is considered preferable as affording a better regulation of the heat and the obtaining of the greatest heat in the top of the kiln. The burning takes from seven to nine days and is not hurried, sufficient time being allowed to let the brick shrink slowly and for the kiln to become uniformly heated, before the temperature is raised to the vitrification point. At this temperature the kiln is closed and remains undisturbed for several days.

A NEW METHOD of determining approximately and quickly the amounts of free lime and of gypsum in cement is described as follows: Use ten grammes of the cement and put it into 400 c. c. of water in an ordinary 500 c. c. tubular measure, with 100 markings and about 10 inches between zero and containing mark. Cork and shake up for a couple of minutes, so as to mix well. Twist in fingers to get equal settlement of the cement, and stand by for an hour so as to clarify. Then, from a saturated solution of ammonium oxalate, pour in up to the 500 c. c. mark. At once a white cloud of lime oxalate will form, which allow to settle for a couple of hours and note height above the cement. Each graduation mark will equal 1% free lime in the cement. A saturated solution of barium chloride will reveal the presence of gypsum in the same way, but in this way one-half a graduation will indicate 1%.

THE comparative cheapness of a ditch water supply or a pumped water supply for hydraulicking in the Klondike and other Arctic districts depends on the particular mine to be exploited. The cost of either has to be paid by the gold coming out of the mine. The capital investment for the ditch supply will be larger than for the pump plant. The operating expense of the latter will be the larger. The comparison is made of the sums that it is estimatable each will have cost the mine when the latter is worked out. On even cost estimates the pump plant is preferable as involving the least risk and offering the quickest returns. The pump plant can be run for supplying water for hydraulicking at its maximum efficiency under a constant load. The prime mover power need not be steam. It may be electrically transmitted water power or it may be direct water power. A large volume of water used under a low head on a water wheel to provide power to lift a small volume to a considerable elevation, or the large volume may be used in a hydraulic ram or battery of hydraulic rams. Very high heads are not required for hydraulicking the known Alaska placers; none of the gravels are cemented.



## Compressed Air Traction Plant, Red Point Mine, Placer County, Cal.\*

Written for the MINING AND SCIENTIFIC PRESS.

The Red Point mine is a gold placer situate in Placer County, Cal., on what is locally known as the Forest Hill Divide, 15 miles toward the summit of the Sierra Nevada mountains from the town of Forest Hill. It adjoins the Hidden Treasure mine and, like it, is exploited as a drift mine. Both are sections of Neocene river channels which were obliterated as such by filling to depths of a thousand feet or more by volcanics. Subsequent erosion of new stream channels, replacing those buried, has cut the country surface in deep canyon lines across and alongside of the old channel beds until the latter were left part of existing mountain summits. The method of drift mining developed from the physical position of the gold-bearing placer in the heart of the mountain consists in driving tunnels through the solid rock rims of the side of the mountain, so that they enter the unconsolidated gold-bearing gravel beds of the old channel beneath the covering of volcanics. The tunnel then furnishes a gravity drainage outlet for large flows of underground water, collected in and following the old stream beds, and the gold-bearing gravel is attacked and removed much in the manner of the mining of coal. It is the winning of a horizontal-lying deposit of ore as contrasted with the winning of a proximately vertical-lying deposit.

The Red Point mine is notable from the mode in which its discovery was made. Unlike most of the

tance, with up-hill gradients varying from 1% to 3%, the total rise is 240 feet. The fast-increasing distance of haulage some years since compelled a change from the use of horses. The loaded cars run out of the mine by gravity under the brake, but the haulage with the grade and distance to be overcome was the difficulty. The installation made and now in operation was designed by H. C. Behr, mechanical engineer, then of San Francisco, but now of Cape Town, South Africa.

The choice lying between electric traction and compressed air, the economic conditions made the decision in favor of the latter. The workings in the channel were more or less uneven in height, dependent on the full depth of the gravel, which was all mined out. The roof consists of a hard, compact volcanic cement. For mining the gravel it was not necessary to remove this or the bedrock on which the gravel rests. The latter is cut down in the tunnel to provide a more even track floor, a better water drain channel and to give sufficient height for traction. The roof of cement is, however, kept unbroken. The illustration on this page shows the relation described, the tunnel track cut in the bedrock, the breast in the gravel on the unbroken bedrock, and the solid rock roof, which, unbroken, only requires posts to hold it.

The installation of electric traction would have required a very large expense in cutting the roof, and extra expense in wiring the trolley, owing to turns and irregularities of the tunnel. There is practically no tunnel timbering to which the trolley insulators could be attached. Since the compressed air installation for traction was made in the Red Point mine, an electric traction installation has been made in the

Hidden Treasure mine, adjoining. This is described in Vol. LXXIX, page 604, of this journal. In this installation the difference of initial cost was in favor of the electric installation. The tunnel is everywhere timbered and did not require any additional cost of cutting to provide for putting in trolley wires. In both cases the operating prime mover was the water flowing out through the mine openings. The two different systems of traction installed in the two adjoining and similar mines, each in its particular place the most economic for that place, shows how impossible it is for broad generalizations to be made as to comparative economy between electric and compressed air systems of traction. Each mine is a problem by itself, demanding economic solution, not from generalizations from practice elsewhere, but from the special conditions as they are found to be in the partic-

ular mine. In the Red Point mine the mine waters are the prime mover for power for all purposes for which power is used. The water is first caught up and turned into a pipe well up toward the inner face of the upstream workings. This pipe delivers the water under the head of the tunnel fall to a 36-inch Pelton wheel, located in the tunnel about  $\frac{1}{2}$  mile from the entrance. This water drives a No. 4 Baker blower, giving its positive pressure as an addition to the air pressure in an 11-inch pipe from a blower outside of the tunnel. From this Pelton wheel the water flows through the tunnel to the entrance, where it is divided. The total quantity of flow is 70 cubic feet a minute. Of this, about 30 cubic feet is conducted to the storage tank, to be used for washing the gravel. Forty cubic feet is turned into a pipe leading down the mountain slope and is used under 103 feet head on a 36-inch Pelton wheel, driving a No. 4 Baker blower. These two blowers and the single 11-inch pipe line, conducting the air to the workings in the face, ventilate the mine.

After use driving the blower the water passes through a head box into another pressure pipe line. Under several hundred feet pressure the water operates a 5-foot Pelton wheel, driving a three-phase Simmons air compressor, which compresses 120 cubic feet of free air per minute to 800 pounds to the square inch pressure. From the receiver a strong 2-inch pipe conducts the air 3500 feet to the tunnel entrance and 11,500 feet farther into the tunnel. In addition to providing several convenient charging stations, the long pipe acts as a receiver, giving added storage capacity.

A six-ton air locomotive, with a storage capacity of 60 cubic feet of compressed air, takes the air from the charging stations at 700 pounds pressure. The illustration on the front page shows the locomotive. From the large receiver on the locomotive the air passes through a Foster reducing valve and is reduced to 200 pounds pressure. It is then reheated to 300° F. and, passing into cylinders, is used in all respects as if it were steam.

The locomotive takes sixteen to eighteen cars into the mine at a trip, at a speed of 9 miles an hour. The engine is charged before starting into the tunnel and takes a second charge in the tunnel. A single charging will run it up the tunnel grade with the train of empties for 2 miles. Coming out, the down grade of the track takes the loaded train out of the tunnel by gravity. The track consists of thirty-pound rail and ties are placed 1 foot apart.

The mine employs sixty-five men. The output of gold has been quite uniform through the entire period of operation. Variations in width of the channel and quantity of gravel have been found to be compensated to some extent by opposite changes in the quantity of gold content. With the adjoining Hidden Treasure mine the Red Point mine is a typical drift mine, representing in its operation all the perfection and detail and economy of cost that experience in this kind of mining has suggested.

### From Nome City, Alaska.

TO THE EDITOR:—I would advise, after having had experience, California miners and others to stay at home and a long way from Nome. Use as much energy in developing a mine at home as we do here to find one, and you will be ahead of those who come here. To those who are thinking of coming here, hoping to find work, I would advise to "stay where they are." There are already ten men to each chance of employment, and there are a number of men here now begging for work.

In the winter there is no work to be had. There are three months in the year in which mining can be accomplished—July, August and September. The remaining nine months bring no income. Shovelers out on the creeks are paid \$5 per day and board for ten hours' work, and at some places they get their pay provided it is taken out of the claim. It will cost one man \$500 to winter here. Every steamer from the outside comes in here loaded with hundreds of men, and very few of them have enough money to last them over a month. The business houses of Nome are not doing the business that a California mother lode town would do. The money in circulation now comes from Dawson and the States. There is very little gold coming in from the creeks up to this date.

The country has been well covered and there is not a spot of ground unstaked in the district. I have just come in from a 30-mile mush and find it staked to the mountain tops. There is a vast territory here, but it is not all good. The creeks are very spotted. There are a few good creeks about 5 miles from here that have proved very rich. Anvil creek, where the first discoveries were made, comprises thirteen claims. Dexter, Snow, Glazier, Dry and a few other creeks are very short and comprise the cream of this district. I think it reached its zenith this last season.

The beach is now being worked over for the third time, mostly by men who have been out on the creeks and found their claims no good. The beach sands all carry fine gold—so fine that silver plates are necessary. Two men and myself rocked on the beach all day and cleaned up \$1.70—and we had as good a prospect as any of the others.

Stampeding and staking in the winter has proved very unsatisfactory, as the whole country is covered with snow and ice and no prospecting can be done.

There are miners coming in from the Bluestone, Arctic and Kougrock districts every day with very discouraging reports. Men who have claims to sell are trying to boom the country. To get a claim that has not been located one would have to go up in the Arctic district. It is my opinion of this part of Alaska that it is overrated.

Nome has a population of about 5000. It is estimated that there are 40,000 prospectors in this portion of Alaska this season. WM. G. ANDERSON.

Nome, Aug. 8.

### Electric Energy From Wind.

From long and careful studies of the atmospheric conditions in northern Germany, M. G. Couz of Hamburg has taken up the question of the industrial application of the winds which are always abundant in that region. He has discovered a system of electric regulators to obviate the inconvenience of variation in the velocity of the wind. To put his ideas in practice, Herr Couz appealed to F. Neumann, a manufacturer of windmills at Wittkiel, who put a large windmill at his disposition. The wheel had a regulator to keep its speed constant for a certain number of turns when the minimum velocity of the wind to keep it moving at that speed had been exceeded. This wheel, which in a tempest can furnish 30 H. P., charges a large storage battery for electric lighting and power at Wittkiel. Some experiments were made last September and the results surpassed all expectations. These experiments, which were admirably conducted, make it possible to hope that small localities, will be able to secure electric light and power from the wind at almost no cost. The expense of establishing such an installation is extremely small in comparison to the immense advantages which it secures.



Three Miles Underground, Red Point Mine, Placer County, Cal.

California placers, the locus of which was discovered in the early mining days, even if not then mined, the existence of this particular gold-bearing placer is a comparatively recent development. J. B. Hobson, at that time (1885) of Placer County, but now manager of the Cariboo Con. Hy. mine, at Bullion, B. C., deductively from the geology becoming satisfied that the gold-bearing old river channel traversed the ground, now the Red Point, located and bought the area and interested French capital in its exploration. Ross E. Browne, M. E., of San Francisco, then made an elaborate survey of the ground and adjoining mines that were being operated and made a proximate location of the line and elevation of the old buried channel, and what is now known as the Red Point tunnel was projected and run to develop the channel. The method of location employed—a practical application of topographic and geological surveys—was novel then. Very little of that class of work had been done then, and none on so large a scale, or for the development of a channel that was buried throughout its whole extent for many miles and only doubtfully identified in the underground workings several miles apart. The tunnel projected by Mr. Browne proved successful, striking only 15 feet below the bed of the channel at 2000 feet, the projected distance having been 2400 feet. The close determination of the actual geological facts in advance, deductively in this instance, was a brilliant demonstration of a theory applied. Descriptions in detail of this work appear in the VIII Annual Report of the State Mineralogist of California, page 749, and following, and in Volume LXVIII of this journal, pages 151, 165, 181.

The Red Point mine has been operated continuously since 1887 and has been continuously a profit-earning mine. The main tunnel, following the turns of the old channel, has been extended until the face of the working is now about 17,500 feet from the entrance to the tunnel, nearly  $3\frac{1}{2}$  miles. In this dis-

\*See illustrations on front page.



## The Redridge Dam.

The extensive works being carried out by the Atlantic Mining Co. and the Baltic Mining Co. under the direction of their agent, Frank McM. Stanton, M. Am. Soc. C. E., for the development of their properties in the copper region of northern Michigan, include the construction of a high dam on the Salmon Trout river, at Redridge, Mich., to furnish water to the stamp mills. The site is only a few hundred feet from Lake Superior, and the crest of the dam will be about 84 feet above the normal lake level.

The Redridge dam is unique in being a gravity dam of combined concrete and steel construction, and in fact it is the first of its kind. Upon the concrete

Along the rear of the dam extends a steel trestle for a railway track.

**FOUNDATIONS, ETC.**—The dam is founded on bed-rock for its entire length, except under part of one core wall, where an impervious clay was encountered. The rock is hard, strong and generally free from fissures; but it has been more or less eroded at a point a short distance above the present dam site, where a wooden dam with crest some 20 feet lower than the present dam has stood for many years.

To guard against the possibility of water working its way from these eroded holes between the rock strata, and finally underneath the new dam, the novel plan was devised of making an impervious cut-off dam in the natural rock above the site of the new dam. This cut-off dam was made by making a line of drill-

ment, with concrete core walls extending back into the hillside, the core walls being supported by earth embankments. The abutments serve for both the dam and the railway structure. Beyond the end bent of the steel work, and forming an extension of the steel face, extends a plate about 4 feet wide, with a steel angle riveted along the outer edge. The plate and the end bent are embedded in the abutment, and thus firmly anchored. The abutment is bonded to the core wall by steel rails put together in pairs, with 2-foot anchor rods between them. These are embedded horizontally in the concrete.

Some measurements of concrete in place indicated a weight of 165 pounds per cubic foot, and tests of 6-inch cubes have shown a crushing strength of 1800 pounds per square inch at twenty-six days. The per-

missible loading under bearing plates is limited to 200 pounds per square inch, and at these places also a special concrete is used. On the main body of the dam the pressure induced by the water is very much less than this. In the calculations, the weight of the concrete was assumed at 145 pounds per cubic foot, so that the actual structure has an excess of weight. The concrete is mixed comparatively dry, with only enough water to flush to the surface during ramming. There are about 8000 cubic yards of concrete in the main dam, and about 2000 cubic yards in the abutments and core walls.

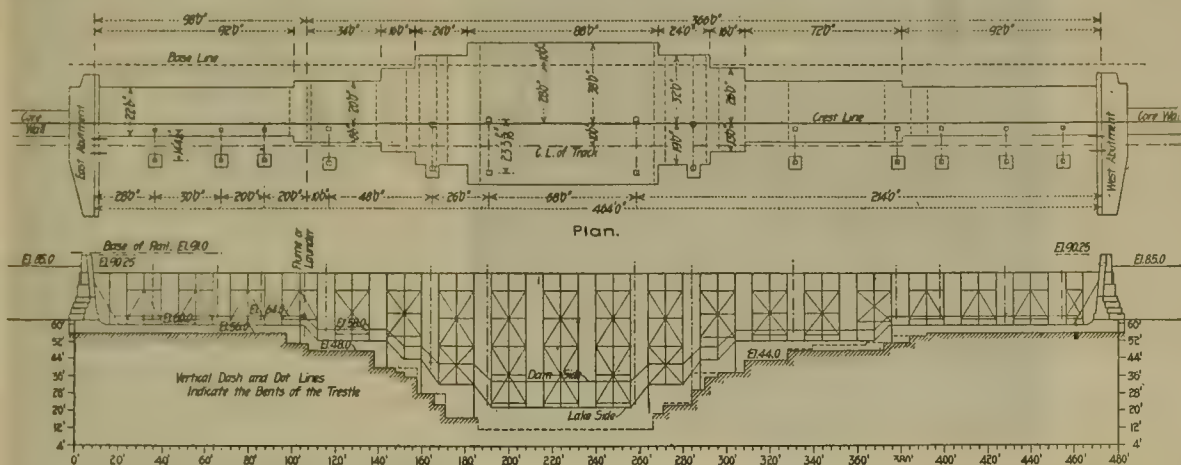
The profile of the upper part of the concrete is inclined, to conform to the slope of the steel facing, the beams of the steel bents being embedded in the concrete, as shown. The concrete extends up behind the steel facing, and forms a bench where the curved steel face plates end, this bench being covered by an inclined diaphragm plate. To secure plane contact between the

To ensure close contact of the steel and concrete, holes are tapped in the diaphragm plate, to which nozzles for grouting pipes can be screwed, the grout being forced in behind the steel under a pressure of about ninety pounds. The concrete was not built to its full height at first, but only far enough to receive the steel work. Upon this the separate bases for the steel columns were built in forms, in such a manner that these will be embedded in the upper mass of concrete. To ensure the proper position of the anchor bolts, the forms for the column bases had frames attached so that when the forms were in position the ends of the rods rested upon the frames in the positions they occupy in the finished work.

**STEEL SUPERSTRUCTURE.**—The steel portion of the dam is 464 feet long on the crest, between the concrete abutments, and consists of a series of steel bents or A-frames, 8 feet apart, to which is riveted a facing of steel plates. These bents are braced together in sets of three, as shown by the elevation in Fig. 1. Typical cross-sections at the highest and lowest portions are shown in Fig. 2. The face is inclined at an angle of  $55^{\circ} 10'$ . In each bent, all the members are in compression, with the exception of the members parallel with the face, and also, of course, excepting the anchor rods. The face member is an I-beam (15-inch in the smaller bents and 24-inch in the others); all the other members are built up of angles, Z-bars and plates, as shown in Fig. 2. All the material is of mild steel. Riveted between the bents are  $\frac{3}{8}$ -inch curved face plates, concave to the water, 7 feet  $5\frac{1}{2}$  inches wide over the chord, and having on each side a flat strip  $5\frac{7}{8}$  inches wide, which is riveted to the flange of the I-beam. The radius of the curve is 7 feet  $5\frac{7}{16}$  inches. The plates are 16 feet high. Below the bottom course of curved plates is a course of flat plates, and the open space thus left in each bent is closed by a segmental inclined diaphragm. The vertical joints are double riveted, the face plates lapping each other on the I-beams. The horizontal joints are single riveted, with welt strips on the back. The rivets are  $\frac{3}{4}$ -inch diameter,  $2\frac{1}{2}$  inches pitch.

One of the peculiar features of the construction is that below the  $\frac{3}{8}$ -inch face plating of the steel portion, is a facing of flat  $\frac{3}{16}$ -inch steel plates covering the concrete base. At the bottom this plate is let into a trench sealed with a rich cement mortar. This plating is in courses, 3 feet 6 inches high, put together with  $\frac{3}{8}$ -inch rivets, and stiffened by vertical angle irons at the back, 4 feet apart. The crest of the dam is finished with a fascia plate cut to fit the curved face plates.

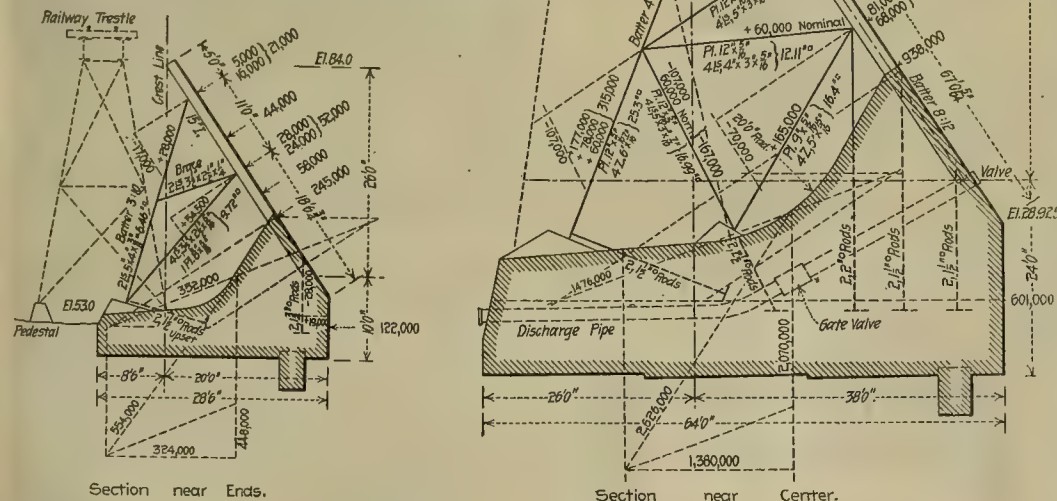
**CONDUITS AND DISCHARGE PIPES.**—Passing through the concrete base of the dam, 20 feet below the crest, are three 24-inch intakes, with cast iron mouthpieces. These are fitted with screens and have bronze sluice gates sliding in guides, and operated from the top of the dam by hand wheels and screws. They are also controlled by 24-inch gate valves, directly accessible in valve pits formed in the concrete. On the west side the intake will connect with a 38-inch riveted steel pipe leading to the Baltic mill, 2200 feet distant. For the purpose of regulating the level of the reservoir four 24-inch discharge pipes are built into the concrete base, as shown in Fig. 2. Like the intakes, these are fitted with a double system of con-



**Fig. 1. Plan and Elevation of Dam.**

base is a steel superstructure consisting of a series of bents or A-frames carrying steel face-plates, and in this respect the dam is similar to the steel dam built for the Atchison, Topeka & Santa Fe Railway, at Ash Fork, Ariz. The most important difference in the design of the two dams lies in the use of a concrete base in the Redridge dam. In the Ash Fork dam concrete is used merely to effect a watertight joint at the heel, the steel structure being anchored directly to the rock in a canyon, and relying upon its anchorage to resist overturning or sliding. In the Redridge dam, however, the natural formation was not so favorable to such a construction, and it was decided to use a concrete base of such dimensions as to constitute a gravity dam. To this base the steel structure is anchored. The proportions are such that at any section of the dam the resultant of all pressures (when the water is level with the crest of the dam) falls within the middle third of the concrete base. The calculations were made to include sufficient friction to provide against sliding (coefficient of friction, 0.69), but there is a large additional margin

holes in the rock clear across the canyon and forcing them full of cement grout. This line of holes was made about 20 feet above the upstream face of the dam, and parallel with it. The holes were made 2 inches diameter, 10 feet deep, and spaced 7 inches apart. Grout was forced into these holes under an air pressure of ninety pounds per square inch, and



**Fig. 2. Cross-Sections of Dam.**

of safety against sliding movement through the fact that the concrete base is built in a trench 2 to 4 feet deep in the rock.

The dam is 1006 feet long, and the length of the steel portion is 464 feet between the abutments. The maximum height is 74 feet. At either end of the steel dam are earth embankments with masonry core walls, bringing the total length of the dam to the figure above stated.

The reservoir formed by the dam will have an area of 150 acres, and an available storage capacity of 600,000,000 gallons, the intake pipes being placed 20 feet below the crest. The water will be carried by steel conduits to the stamp mills of the Atlantic mine, 1300 feet distant, and the Baltic mine 2200 feet, the estimated daily consumption being about 25,500,000 gallons. A wasteway is provided for flood water, no water being allowed to pass over the crest of the dam.

there was good evidence that the grout did fill and seal openings in the rock adjacent to the holes. After this work was done, the rock floor between the dam and the line of holes will be cleaned and covered with a concrete pavement, and that in turn by a puddle bank.

**CONCRETE BASE.**—The concrete base was at first planned as of approximately rectangular section, but in the adopted section a much better distribution of the material has been effected, the height being very much greater at the upstream face than at the toe, as shown by the strain diagrams in Fig. 2. The sealing wall 4 feet wide and 5 feet deep, is carried below the base of the dam. The dimensions of the section vary at different parts of the dam, according to the depth, the variations in both width and depth being made by off-sets, as shown by the general plan and elevation, Fig. 1. At each end is a concrete abut-



trol: The mouth of each pipe has a sliding gate, with stems carried by brackets riveted to the face plates and operated by hand wheels and screws above the crest; each pipe has also a 24-inch gate valve, set in a valve pit formed in the concrete, so that the valves are readily accessible for repairs.

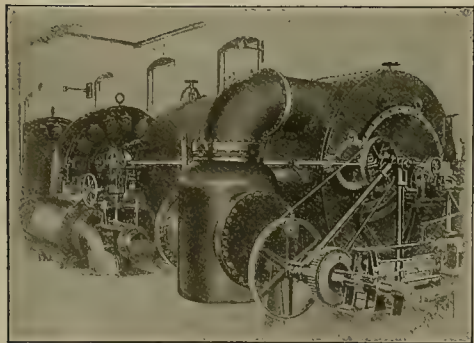
**WASTEWAY AND SPILLWAY.**—As already stated, the dam is not intended to act as a weir, but through the hill on the west of the dam an excavation has been made for a wasteway. The mouth of this is 30 feet long, tapering from 50 feet to 30 feet in width, and having a concrete head wall whose sill is 6 feet below the level of the crest of the dam. Upon this will be steel standards carrying flashboards, which will ordinarily retain the water at full level, but can be removed in time of flood. From the concrete wall extends a timber flume 30 feet wide and 4 feet deep, for a length of 400 feet discharging over the bank of the river. The combined capacity of the flume and the discharge pipes is more than sufficient to dispose of the heaviest flood yet known.

A peculiar feature of the construction of this flume is the provision made for renewing the wearing surface. Longitudinal cedar sills are embedded in the sandy soil, and covered with a flooring of 3-inch pine planks on cross joists. The sides are of similar planks, spiked to stanchions supported by braces. Upon this planking are laid three thicknesses of tarred felt, the sheets extending unbroken from the top of one side to the top of the other side, and breaking joints. This is covered with two courses of 1-inch pine sheathing, the outer one of which can be renewed or repaired without disturbing the water-proofing construction. Triangular timbers are laid in the corners.

**ENGINEERS AND CONTRACTORS.**—The entire dam and its appurtenances are being constructed under the direction of Foster Crowell, M. Am. Soc. C. E. of New York, who is consulting engineer for the hydraulic works of the mining companies, and all plans and specifications were prepared or approved by him. Absence of durable building stone in this region, and the possession by the Atlantic Mining Co. of very excellent rock and sand for concrete, led to the selection of the latter materials in connection with steel for the main dam and concrete core walls with earth embankments for the wings. So far as the steel and concrete combination is concerned, the proposition to adopt a dam of this type originated with J. F. Jackson, Assoc. M. Am. Soc. C. E. of Houghton, Mich., who is resident engineer for the Wisconsin Bridge & Iron Co. It was evident, as stated above, that the dam could not be anchored directly into the rock, as had been done at the Ash Fork dam. The idea of combining a concrete base and a steel superstructure so as to form a gravity dam then occurred to Mr. Jackson, who proceeded to work out forms and sections for heights varying from 28 feet to 74 feet, as included in the main portion of the dam.—Engineering News.

#### McCormick Turbines Operating Electrical Machinery on Comstock Mines.

The accompanying illustration shows a pair of 27-inch McCormick turbines mounted in an iron case on horizontal shaft direct connected to a generator. They develop 1400 H. P. with 400 revolutions when operating under 84-foot head. The variations in load are taken up by a Ludlow relief valve working in



connection with a Lombard water wheel governor. Two 15-inch McCormick turbines in iron cases on horizontal shafts are direct connected to the exciters. Two of these settings complete were built by the S. Morgan Smith Co., of York, Pa., for the Truckee River General Electric Co., Floriston, Cal. The power is transmitted 35 miles to the Comstock mines, where it is used for pumping, hoisting, mine lighting and operating the mills.

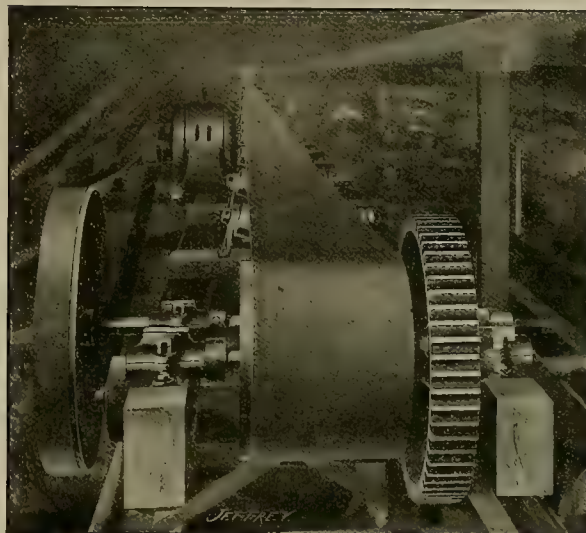
Those interested in the development of water power are requested to write the S. Morgan Smith Co. for catalogue of the McCormick turbine.

THE first test of a new system of electric traction by high tension alternating currents on the Lake Como road, in the Italian Alps, is reported as having surpassed the expectations of the installing engineers. A correspondent of the Electrical Review who saw the system tried says a speed of 75 miles an hour was secured without any serious jarring and

that trains of five cars were easily transported at this speed even on decided grades. The dynamos work perfectly at 21,000 volts on a line 67 miles in length. This new method of electric traction is what is known as the high tension polyphase system.

#### Century Traveling Belt Conveyor.

A traveling belt conveyor is a device that finds useful application in connection with reduction works and metallurgical processes, being operated without



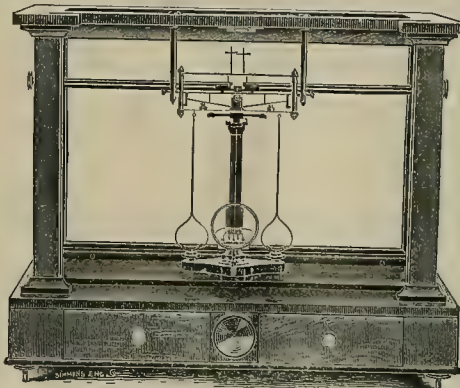
the aid of tripping contrivances to discharge its load at any desired point on the line of discharge.

The illustration herewith shows such a conveyor as made by the Jeffrey Manufacturing Co. of Columbus, Ohio. It consists of their "Century" type of rubber belt with troughing rolls, the whole affair, together with the electric motor that drives it, being mounted upon truck wheels which run on tracks over the line of discharge. The conveyor illustrated is installed in a cyanide mill for the reduction of gold ores, and delivers the crushed material to a line of vats, depositing it anywhere along the line, according to the position in which the conveyor is placed. The conveyor is supplied with ore at a point near the center of the line of vats, and is but one-half as long as a stationary conveyor would be with a tripping carriage, as it carries either to the right or left, the motor being a reversible one to admit of the change.

In some cases, where the conveyor is a long and heavy one, the truck is made self-propelling, being driven along to the desired location by the same motor that drives the belt. Connection with the motor is provided by a flexible cable or an ordinary trolley line.

#### A New Short Beam Balance.

An assay button balance with a 4-inch beam, herewith illustrated, has lately been put on the market by Wm. Ainsworth & Sons of Denver, Colo. They claim for it that with other improvements it may be operated faster and that it swings quicker than other balances. The base is extended on either side so as to include the pan rest bearings, thus insuring their perfect alignment, together with that of the center rod, and by removing the rider bar support screw and the two base screws the entire upper works may be removed for cleaning. An improved rider apparatus is provided, the slides being cushioned and German silver springs provided which take up all wear. The balance has a 4-inch beam, divided



into fifty parts each side of the center, and, being unobstructed on the top, the rider may be placed at any point from zero at the center to the last division at either end, which is directly over the end edge and represents the full weight of the rider used. Special reading glasses are provided for the beam and index, all bearings and edges are of agate, and it has fall-away pan rests and plate glass sub-base.

#### System of Zinc Ore Buying in Missouri.

In the purchasing of zinc ores it should be understood that blende, or "jack," as it is commonly termed, is based upon an average assay value of 6% zinc and an allowance of 1% iron which is not penalized. For each per cent of zinc below 60% \$1 per ton is deducted from the market price. For each per cent of iron greater than 1% a deduction of \$1 per ton is made. For each per cent of lead in a ton of ore 50 cents per ton is also deducted. For each per cent above 60% \$1 is added to the basic price. For example, a shipment of ore may assay as follows: Jack 58%, iron 2%, lead 1%. At \$25 per ton for 60% stuff, this shipment would be penalized \$1 for each per cent of zinc below 60, or \$2. As the ore carries 1% more iron than the 1% which is not penalized, another deduction of \$1 must be made. Of lead the ore carries 1%, enforcing another deduction of 50 cents, making a total deduction of \$3.50, and the net purchase price of the shipment \$21.50. Should the ore assay 62%, as is so far the case with most of the sample lots of Arkansas ores, and there be little iron in the stuff, then the 2% in excess of the basic value would add \$2 to the purchase price, making it \$27.

In order to arrive at the assay value of the ore, an excellent system of sampling has been reached, after years of experience, by the ore buyers and the mine operators. A few shovelfuls of the moist jig stuff is taken from the car after it is loaded and the stuff carefully mixed together and quartered down to samples from one to five pounds in weight in the presence of both the ore buyer and seller. Each takes one part of the sample and the third is held for an umpire assay in the event that there should be a dispute between the buyer and seller over the assay value, or for use in case of accident. Each party to the sale has his sample assayed, and unless there be a variance in the returns of more than a few tenths of 1% the average of the certified results is accepted by both as the basis of settlement.

The determination of the amount of moisture in the stuff is made in the usual manner. Jig stuff ready for shipment varies from 1% to 4%, according to the quantity of fine concentrates it contains. Buddle, or sludge headings, when fresh, carry from 10% to 12% and fine sludge concentrates from 12% to 17%.

Carbonates (or dry bone) are sold at an agreed price per ton. They are sold in the Joplin district at from \$10 to \$15 per ton, delivered at the railroad station. Their assay values in the Joplin district range from 40% to 48%. As yet carbonate ores are not sold upon an assay value. Silicates are sold in the same manner as carbonates.

To put the matter as an assayer would put it, ore is bought according to a price found by the following formula:  $WQ - (E + P)$  where  $W$  = weight of zinc, in pounds, contained in a ton of ore, as found by assay;  $Q$  = St. Louis quotation in cents per pound;  $E$  = total charges (freight, commission and treatment charges), usually fixed at \$10.50 per ton;  $P$  = smelters' outfit =  $100Q$  when ore assays 60% or over. In addition, deductions are made from this price of 50 cents for each per cent of lead and \$1 for every unit of iron in excess of 1%. Then an ore carrying 60% zinc, 1% lead, 2% iron, spelter quoted at 4 cents would bring  $1200 \times 4 - (10.5 + 4 \times 100) = 48.00 - 14.50 = \$33.50$ . From this deduct \$1 for iron and 50 cents for lead, or \$1.50; net price, \$32 per ton.—The Lead and Zinc News.

A TREASURY STATEMENT recently issued gives details regarding the imports of gold at Pacific coast ports which are of more than ordinary interest. According to the statistics the receipts of gold at San Francisco and the Puget sound and Alaskan ports during the year ending June 30, 1901, amounted to \$45,923,289. It is to be observed that the gold output of the Klondike and other districts in the Canadian northwest is treated in the same way as Australian or other foreign specie. The figures show that in the year \$23,704,493 of gold came from Australia and the Orient to the Pacific cities of the Union, while the Klondike gold they received amounted to \$21,318,796, making a total of \$45,023,289, as compared with \$23,117,050 in the previous year. This large increase is made up of gains of \$14,438,562 in the Australian and \$8,367,077 in the Klondike gold.

THE Division of Soils of the United States Department of Agriculture has just described a new instrument now in use for investigating the properties of soils. This is a great time and labor saving apparatus, giving accurate and reliable results, which otherwise would require months to obtain. The new apparatus as devised by the Division of Soils is an electric affair. It registers a half dozen or more various soil properties. This method depends upon the principle that the resistance offered to the passage of an electric current from one carbon plate to another buried in the soil depends upon the amount of moisture present between the carbon plates or electrodes.

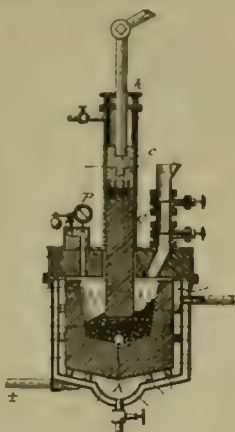


## Mining and Metallurgical Patents.

Patents Issued August 20, 1901.

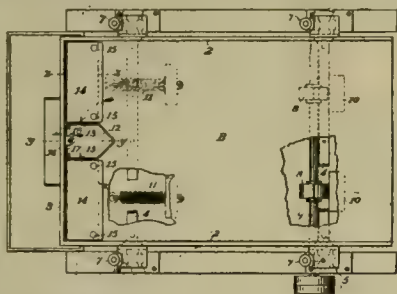
Specially Prepared for the MINING AND SCIENTIFIC PRESS.

ELECTRIC FURNACE.—No. 681,107; A. H. Cowles, Cleveland, Ohio.



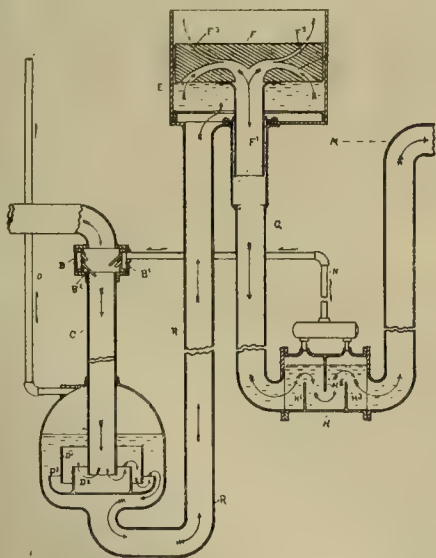
An electric furnace, furnace-chamber walls of which are composed of carbon permeable to vapors and gases, a cooling jacket outside of walls, and means for electrically connecting jacket with exterior of walls to form condensing space or chamber between jacket and walls.

CONCENTRATOR.—No. 680,938; A. B. Paul, San Francisco, Cal.



A longitudinally movable table having inclined bottom, closed sides and lower end, with one or more chambers located at lower end having controlled discharge opening and slots opening into lower part transversely of line of movement of table, plates above slots, extending from sides of chamber to sides of table, a frame composed of longitudinal side timbers between which table is suspended, plates projecting from table above frame timbers having contact surfaces formed upon front ends, elastic buffers fixed upon frame timbers in line of movement of plates and means for retracting table and moving it suddenly forward, so that it will produce a concussive movement between contact plates and buffers.

HYDRAULIC AIR COMPRESSOR.—No. 680,951; A. G. Waterhouse, Springfield township, Pa.



A series of two or more air compressors, each separate compressor having a stand-pipe, through which water has an unobstructed flow, from its head down to lowest level below that of its tail-race and into a well or passage, leading up to its tail-race; each stand-pipe is provided at its upper extreme, with means for causing descending water to draw in air and carry same down with it, and, at its lower extreme, with an air collector, for separating air from water, each compressor having an air-pipe,

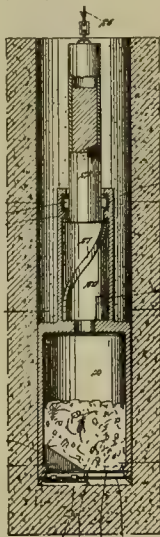
leading from its air collector to stand-pipe of another compressor, at lowest level at which air will enter, all being constructed in the order whereby air from compressor having least compressing force will have its compressed air conducted to stand-pipe of another compressor, having next higher compressing force, from where its air, together with air from first compressor, will be conducted to a third compressor, and so on, until air collected by compressors is conducted to a final one, where it is further compressed and conducted for use.

ROCK DRILL.—No. 681,011; O. G. Worsley, Newark, Ill.



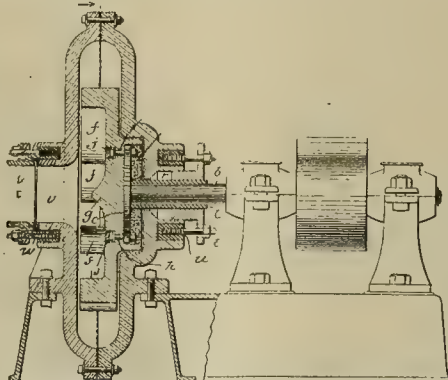
A chambered stock having a lateral aperture, a cutter housed within chamber and projecting through aperture, and having a bearing against top wall of aperture, against wall of stock opposite aperture and against wall of stock below aperture.

DRILL.—No. 681,035; T. P. Blake, Lamar, Nev.



A hollow body forming a bucket, a bit or bits at lower end, sleeve carried rigidly on top of body and formed with internal thread at base of which is lug spaced therefrom, sleeve also having interior switch-rib, and plunger working vertically in sleeve and provided with lug adapted to ride on thread within sleeve and to engage rib or lug at base, switch rib serving to turn plunger on its upward movement to recover its engagement with thread.

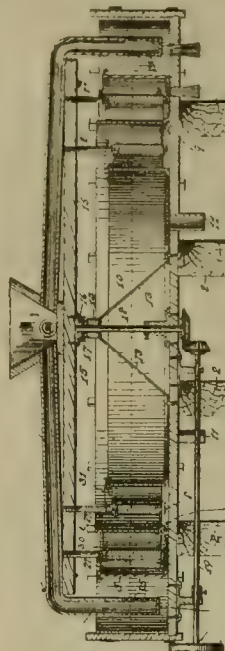
ROTARY PUMP.—No. 680,722; M. Mauran, Niagara Falls, N. Y.



An earthenware chamber consisting of detachable

sections, a rotary shaft entering chamber and provided with enlarged end or head, a non-corrodible sleeve carried by shaft, a packing device surrounding sleeve, an earthenware disk provided with wings and secured to face of shaft head, and a layer of protective material extending from sleeve to disk and protecting shaft head.

AMALGAMATOR.—No. 681,034; A. R. Black, near Lamar, Colo.



A tub and separated stationary amalgamated plates therein, amalgamated plates located between stationary plates and adapted to rotate between and in relation to them, a perforated feed-pipe movable between stationary plates in pulp in tub, whereby material to be amalgamated is fed to plates under surface of pulp in which feed-pipe moves.

COPPER ALLOY.—No. 680,819; B. S. Summers, Chicago, Ill.

The alloy consisting of approximately one-tenth of 1% of magnesium and commercially pure copper, being capable of being readily cast.

Specimens Received by the California State Mining Bureau, May 1 to July 31, 1901.

Gold quartz, Baliol mine, Sutter Creek, Amador Co., Cal.; W. H. Storms.

Quicksilver ore, peculiar specimen showing infiltration of siliceous solution, Silver Bow mine, Napa Co., Cal.; B. M. Newcomb.

Ruby silver, pyrrargyrite crystallized specimens, gold quartz and auriferous calcite, Great Barrier island, New Zealand; Albion S. Howe.

Lepidomelane, Isabella, Kern Co., Cal.; M. G. Mendoza.

Quicksilver ore, Ygnacio mine, San Benito Co., Cal.; F. C. Mathyas.

Roofing slate, Eureka quarry, El Dorado Co., Cal.; G. S. Estey.

Barite, Baxter tunnel, Copper City, Shasta Co., Cal.

Loadstone, 1½ miles from Baird's, Shasta Co., Cal. Gaylussite, Mono Lake, Cal.; S. Soderling.

Phthanite, Trinity Co., Cal.

Quartzite, near Spenceville, Nevada Co., Cal.

Pyrrhotite, Black Diamond mine, Shasta Co., Cal.

Gold quartz, Allee mine, Scott Valley, Siskiyou Co., Cal.; W. Dyer.

Silver ore, Santa Ana mine, Pinos Altos, Chihuahua, Mexico; F. M. Lyle.

Porcelain jasper, slope of Mt. Shasta at 12,000 feet elevation; H. E. Josselyn.

Sphalerite, Afterthought mine, Copper City, Shasta Co., Cal.

Native mercury in cinnabar, Socrates mine, Pine Flat, Sonoma Co., Cal.; Dr. C. F. Burgess.

Native mercury in cinnabar and rich cinnabar extracted July 23, 1891, from the Marfa and Mariposa mines, Terlingua, Texas; Montroyd Sharpe.

Rich silver ore carrying gold, Tonopah, Nye Co., Nev.; H. Wadsworth.

Muscovite (amber mica), Custer City, South Dakota; Denis Henault.

Malachite, White Rock mines, Mariposa Co., Cal.

Redingtonite and knoxvillite, two very rare chromium minerals, Redington quicksilver mine Napa Co., Cal.; B. M. Newcomb.

Copper ore, melaconite, chrysocolla and azurite, California &amp; Nevada Copper Co.'s mine, Yerington, Lyon Co., Nev.; David M. Coney, Pres.

Forty-two exhibits of copper ores from California, from new locations principally.

H. S. DURDEN, Curator.



# MINING SUMMARY.

Specially compiled and reported for the  
MINING AND SCIENTIFIC PRESS.

## ALASKA.

### KETCHIKAN.

The Sea Level mine, at Sea Level, Ketchikan district, has let the contract for the iron work of a 30-stamp water power mill and a contract for 200,000 feet of lumber for the building construction. E. C. Morse is Supt.

### RAMPART.

Reports from Dawson state that very rich strikes have been made in the vicinity of Rampart. A big stampede to that place followed. On all the properties opened nothing less than \$1 to the shovel had been washed out. Bedrock is only 8 feet below the surface. The strike is 30 miles from Rampart by the overland route, on Glenn gulch opening into the Tanana river, 70 miles from the mouth of the Tanana. While the discovery seems to be a very rich one, it is not very extensive. Good reports are brought regarding Faith creek, in the upper Tanana placer fields, but nothing big has developed there.

### VALDES.

Valdes has been almost deserted during the summer, nearly every one being in the interior or out in Prince William Sound prospecting for copper. Very rich discoveries of high-grade copper are being made, and the district recorder and clerks have been kept busy recording location notices. Copper locations have been salable. Among the mines now in operation are those of J. D. Menach, the Gladhaugh property, the Williams mines, owned by L. L. Williams of Juneau, and the mine of the Prince William Sound M. & D. Co., of which G. M. Esterly of Washington, D. C., is the head. R. Blei of New York City, representing New York capitalists, has bought a number of claims and has several men in the Tanana country prospecting and a larger number of men prospecting in the islands of Prince William Sound.

## ARIZONA.

### GILA COUNTY.

The Grand Prize M. Co. of Arizona is operating the Grand Prize mine, near Pine, in the Mogollon mountains. The ore at the surface, being an iron oxide, carrying large values in gold, was run through a stamp mill. At a depth of about 100 feet very rich copper sulphide ore was struck. The gold values are very high. Over 5000 feet of development has been done on the mine, the deepest shaft being down about 265 feet. About forty men are employed at the mine. A 100-ton smelter has been installed, which it is intended to blow in about September 1.

### GRAHAM COUNTY.

J. Garten, J. Sanford and H. Wormick while panning the sand in Kilbery canyon discovered a rich gold-bearing ledge with hanging wall of quartzite and foot wall of porphyry. They located two claims on the main lead and two on a smaller one. Sanford and Wormick have sold their interests to E. Randolph and F. B. Hartman of Tucson.

### MARICOPA COUNTY.

The Copper Belle or Gleason mine at Gleason is employing a large number of men and is yielding a good grade of ore. Some of it is being roasted at the mine before shipment to the smelter, and the rest is being shipped unroasted. The work on the smelter is being pushed with vigor and it is expected to be ready to blow in very soon.

J. L. Wetmore, Supt. of the Colony mines, in the Sierritas, says a mill of two tons capacity and a concentrator handle the ores taken from the mines. The dry crushing process is used. The works have closed down, as the rains have so saturated the ore that it cannot be successfully treated.

### MOHAVE COUNTY.

The Weldon M. Co., a Michigan corporation, J. Gamble, Jr., manager, is developing a gold and silver mine situated in the Quijotoa. A 10-stamp mill has been contracted for, which is expected to be in operation before winter.

### SANTA CRUZ COUNTY.

J. W. Thomas of Phoenix, president of the Buena Vista M. & M. Co., says there are eleven claims in the mine his company bought at Patagonia from M. Maloney, and development shows ore carrying copper, silver and gold in paying quantities. The Buena Vista Co. has been recently organized. J. W. Thomas is president, J. A. Elliott secretary and treasurer and F. Cox general manager. The mining force will be increased and concentrators will be put up at the mine to prepare a high-grade shipping concentrate.

## YAVAPAI COUNTY.

The Union or Luke gold mine, in the Bradshaws, 42 miles southeast of Prescott, is being developed. E. Metcalf of Phoenix is Supt. The new owners of the mine have incorporated, with W. J. Rainey president and H. A. Eastman secretary. The offices of the company are in Detroit, Mich.

G. White and H. Minuse are developing the properties of the Brooklyn M. Co. in Agua Fria district. There is a 127-foot shaft on the property. The ledge is from 3 to 4 feet wide, the pay streak 2 feet wide. The ore is free milling and is said to carry \$20 per ton in gold.

## CALIFORNIA.

California has furnished nearly all the quicksilver produced in the United States. Mining for it began before the discovery of gold. The first operations were in 1845, about 15 miles south of San Jose, on the New Almaden mine. There is no record of the product of that mine prior to 1850. For fifteen years or more thereafter it produced at least 90% of the total product of the State. For the past ten years the yield has been comparatively small. From the report of the mine from July, 1850, to December, 1890, prepared by J. B. Randall, for many years the manager, it appears that from July, 1850, to June, 1858, the annual yield varied from 18,035 flasks in 1852-53 to 31,860 flasks in 1854-55. In the years of 1864 and 1865 the yield of that mine was the largest in its history—42,489 flasks and 47,194 flasks respectively. The total yield of the New Almaden mine from 1850 to 1890—a period of thirty-seven years and three months of active work—was 905,888 flasks of 76½ pounds each. The quantity of ore roasted in securing this yield was 1,308,089,440 pounds. The percentage of quicksilver up to 1865 varied from 36.74 in 1850 to 10 in 1865. There was a further falling off in percentage after 1865, the lowest being 1.69 in 1886. About 500 men were employed in the most active part of the mine's history. From January, 1864, to December 31, 1890, the amount of drifting and sinking in the mine was equal to 47.82 miles, at a cost of \$2,131,872. This sum is exclusive of expenses attending the excavations made in extracting ore and other work, while 15 miles more should be added for drifting and sinking prior to 1864. The New Almaden mine has been worked by a New York corporation—the Quicksilver Co.—and has paid \$1,888,411 in dividends on preferred stock to June 1, 1901.

There are now twelve counties in California where quicksilver deposits have been found, as follows: Colusa, Lake, Napa, San Benito, Santa Clara, San Luis Obispo, Sonoma, Trinity, Monterey, Mendocino, Humboldt and Siskiyou. Next to Santa Clara, the counties north of San Francisco have been and are still the largest producers. In the last half of the nineteenth century the California quicksilver mines have produced 1,831,022 flasks of quicksilver. The sale price in San Francisco has been as high as \$118.55 and as low as \$25.25 per flask. The present price is \$46 to \$47. Up to the close of 1899 the 1,831,022 flasks produced probably sold for \$88,000,000. In 1887 Oregon was credited with a product of sixty-five flasks. There are a number of deposits there. More recently a deposit of this ore has been found in Nevada, but whether of sufficient value to be worked is not known. In 1899 there was a deposit reported discovered at Terlingua, Texas, which, it is claimed, has yielded about 1000 flasks.

### AMADOR COUNTY.

Sinking is being continued at the Lincoln mine, Sutter Creek, and the shaft is now down about 1500 feet and will be continued to the 2000-foot level.

It is reported to be the intention of the owners of the Oneida mine at Jackson to erect chlorination works at the mine. The Oneida is employing 150 men and its sixty stamps are said to be crushing 300 tons of ore per day, which pays about \$3.50 per ton.

### BUTTE COUNTY.

The Bay Counties Power Co. of San Francisco is preparing to erect another large power plant in Butte county, 20 miles northeast of Oroville, on French creek, a tributary of the North Fork of the Feather river. Surveyors and other workmen, under T. E. Theberath, chief engineer of the company, are at work at the point named. The company has decided to erect at French creek a generating plant even larger, it is reported, than the one at Colgate, on the Yuba river, which is said to be the largest in California. The plans include the construction of a large storage reservoir on French creek, and a mile-long tunnel through the mountains.

### CALAVERAS COUNTY.

The Calaveras mine, at Murphys, is owned by an Eastern company and operated under the superintendency of J. H.

Heard. The company is doing development work in the lower mine levels. It is stated that a large cyanide plant will be built to treat some thousands of tons of the old Calaveras mill tailings.

H. C. Swank has had a mill test made on fifteen tons of ore from the Pajaro mine, near El Dorado, which yielded \$16.32 to the ton. A mill is projected for the property.

### EL DORADO COUNTY.

The Eastern capitalists who have bonded the Zantgraf mine, near Auburn, intend reopening the mine about the middle of September. H. D. Coles, the former owner of the mine, will very likely be Supt.

A copper smelting furnace which Eastern capitalists have constructed at Alabaster cave, Newcastle P. O., has been tested, but on account of defective flues the starting up has been postponed. It is said that the ore runs about \$14 a ton and that it fluxes readily.

### MENDOCINO COUNTY.

A discovery of quicksilver has been made on Hardin's ranch, near Cahto. The surface croppings and ledge were discovered by J. H. Babcock, a prospector, to whom Hardin has agreed to give a half interest in the mine and immediately develop it. C. Singleton and R. Agnew from Trinity county are arranging for the placing of machinery and a furnace, and from twenty-five to forty men are expected to be employed within the next month.

Rich quicksilver indications have been found on the Harrington ranch, near Cahto.

### NEVADA COUNTY.

The mill and hoisting works of the Rose Hill mine at Nevada City were burned down, the cause of the fire being unknown. R. D. Lawrey is the owner. The mine was not being operated.

### PLACER COUNTY.

(Special Correspondence).—The Turkey Hill drift mine at Michigan Bluff is being operated by the Boston-South Dakota M. Co., J. Calderwood general manager. About eighty men are being worked. The old workings are being cleaned out and some rich gravel is being taken out. A complete map is being made of the complicated underground workings. At the Caledonia quartz mine on Horse-shoe bar a local company, with W. Stuart as Supt., is extending the tunnel 130 feet to cut the shoot. G. Macauley has twenty-five men at work on the Horse-shoe Bar placer mine. The hydraulic elevator plant is being moved to new ground that prospects well.

### Michigan Bluff, Aug. 23.

The Tadpole Con. M. Co., operating near Canada Hill, above Westville, has its tunnel in 55 feet and has found 3 feet of gravel that prospects.

A report from the Bob Lewis No. 2 gravel mine of Westville states that the new main tunnel is being driven in at the rate of 49 feet per week. The company expect to strike gravel in about 1200 feet.

The Bonnie Bee Quartz M. & D. Co. at Blue Canyon expect to install a compressor and run the development tunnels by means of power drills.

### SAN DIEGO COUNTY.

The Hodges Bros. of Yuma, Arizona, and Hedges have bonded a group of eight claims at Hedges to G. H. Barker of Pasadena, Los Angeles county, Cal., for \$75,000, and another group of six claims for \$6000. Development work is being done under charge of G. A. Trumbou and W. B. Hodges. Four shafts are down over 100 feet each, with the ore body improving with depth. In tunneling on the property it is claimed a rich ledge was found.

### SHASTA COUNTY.

The Shasta May Blossom Copper Co., an incorporation recently formed and consisting principally of members of the Granite Creek S. & R. Co. of Boston, has taken a short-term bond on the Kiehl group of copper claims near DeLamar. M. Lindley of Sacramento represents the Boston people.

A six months' bond at \$10,000 has been taken on the Alta group of ten quartz claims located near Kennett. Mrs. J. Wilson owns the Alta group and the bond was taken by J. M. Patterson and D. Reese of Yreka.

M. Russell and W. McTarnahan of Shasta have commenced development work on their mine, known as the Extension, on South Fork.

J. M. Hart and R. Small have bonded for one year at \$5000 the Mullen and Poor Man quartz mines, at Shasta, from J. M. Pfeifer, who is to receive 10% of the net smelter returns on the rock pending purchase.

The Lowdon and Friday copper claims in the Backbone district, near Kennett, have been bonded to the Trinity Copper Co. for one year. The ground consists of

about 200 acres of copper claims and patented ground. The property is owned by J. Lowdon and W. Friday of Redding.

### SIERRA COUNTY.

M. Rohrig & Sons have taken out a pocket of about \$5000 at the claim they are working near Alleghany. Mr. Rohrig is reported as intending to put a mill on the mine early next spring.

### SISKIYOU COUNTY.

The Oregon & California M. & M. Co. of Ashland, Or., have sold their mine, located near Henley, for \$10,000 to H. B. Kelly of Wyoming, G. B. Goodell of Portland, Or., and C. W. Tyrer of Colorado, who have been operating the mine under a bond for several months. The property sold includes a 5-stamp mill. The mine has had development work done upon it to the extent of 500 feet of tunnels and 350 feet of shaft, and the new owners now intend, it is reported, to work the mine extensively.

The McKeag quartz mine on Boulder creek, near Callahans, is said to be prospecting well. The ledge is from 2 to 3 feet in width, and easy to work, the quartz being run through a rock breaker and then put directly into cyanide tanks, the quartz being broken up to ¾-inch mesh. The cyanide process is said to make a good recovery of value.

At Henley, work in the mines has been started again, by putting on more men at the Jillson and LeFlesh mines. Mattern & Co. also have a force at work, and other companies are starting operations in the vicinity of Hornbrook and Henley.

The long tunnel under Cherry Hill mountain, near Yreka, which has been started by the Cherry Hill G. M. Co., will cut four known veins, and should develop the blind ones from which rich float rock came. An air compressor, engine, boiler and power drill are to be installed. The tunnel is to be 1500 feet long, but is expected to be finished inside of six months. Meanwhile the company is operating the mill from the ore bodies higher up on the mountain. It is stated that a ten-days' run in August gave nearly 400 ounces of amalgam, or about \$200 per day mill returns.

### SONOMA COUNTY.

The Carr Realty Co. of San Francisco has begun suit asking that it be adjudged owner of the Socrates quicksilver mine, located near Cloverdale. The claim is based upon the alleged transfer of the rights of the heirs of the late W. D. Carr, who was one of the fifteen original discoverers of the property in 1860. The title is in dispute between some twenty or thirty claimants.

### TRINITY COUNTY.

The Golden Jubilee mine at Trinity Center, J. C. Steele Supt., is running steadily. The ledge is 60 feet wide and averages from \$8 up a ton. The mine is equipped with a sixty-ton cyanide plant and two Huntington mills.

At the Brown Bear mine at Deadwood the upper levels, being supposed to be worked out, a new tunnel was run over 5000 feet to open the mine at greater depth, and the mill was rebuilt at the entrance to the new tunnel. No ore has been struck in this tunnel and preparations were being made to close the mine down. The discovery of new ground in the upper works has postponed this indefinitely. A small seam being followed on the Lambert vein widened to 4 feet, and raising on it widened out to 14 feet of high-grade ore, which is being drifted on in both directions. A good body of ore has been found sinking from the China tunnel.

H. W. Postlethwaite and S. F. Loughborough of San Francisco are prospecting for dredger ground in Hay Fork with a driller. This enterprise has been incorrectly stated as being undertaken by the Risdon Iron Works Co. of San Francisco.

### TUOLUMNE COUNTY.

The Gagnere mine and mill site, near Tuttle town, have been sold to Pennsylvania parties for, it is reported, about \$37,000.

The Mt. Hood M. Co. has bought the steam hoist formerly used on the Manhattan mine, Stent, by the High Point Co., and will set it up on their property at once.

The Riverside mine, near Jamestown, will resume operations about Sept. 1, under the management of H. H. Martin, who, with others, has bonded the property.

The Clio mine at Jacksonville has been bonded to the company formerly exploiting the Bown mine at Tuttle town, the price being, it is said, \$275,000. W. J. Rule will be Supt.

Supt. J. Hamilton of the Jubilee mine, near Sonora, reports that a new shaft has been started and is now down about 60 feet. The test mill run of twenty-five tons, recently completed, yielded \$1400.

The tunnel on the Contention mine, near Columbia, is being extended and an



upraise to surface is being cut 180 feet in. Ore is being stoped and sent to mill for a test run. The property is owned by a corporation, but is being operated by L. M. Howe under a bond at \$11,000.

It is stated that the Keltz mine, near Columbia, will be started up soon. The Keltz was worked continuously for eight or nine years, and yielded considerable gold. The mine is equipped with a 20-stamp mill.

The new mill at the Golden West mine is running steadily. Supt. Restano states that preparations are being made to run the hoist and mill by water power. The water will first be used at the hoist and from there be piped to the mill and used a second time.

The Sunset, a new mine discovered in the vicinity of the Contention mine, near Columbia, is being worked by G. Miner. In a shaft recently commenced a vein 18 inches in thickness prospects well.

#### YUBA COUNTY.

J. H. Ryan, of the Union Mutual M. & Dev. Co. of San Francisco, and F. E. Wright, state that their company, under Mr. Wright, has been engaged four months past in prospecting and locating claims for the company in Yuba county. The company have secured locations on a large lode and intend to construct a mill and oxidizing plant a short distance west of Bullards Bar, taking water from Oregon creek.

#### COLORADO.

(Special Correspondence).—A party of gentlemen, including many members of the American Geological Society, left Denver on Aug. 16, visiting first the saurian beds and "fish graves" along the Arkansas river, near Canyon City, and going thence to the upper Arkansas and Eagle river to view the glaciation of that locality. Some time was also spent on Aspen mountain, in Pitkin county. The trip was continued, via Grand Junction, to Ouray, where the party was conducted by T. F. Walsh, through his Camp Bird mine and mill in Imogene Basin. The journey was continued over the pass to Savage basin, thence to Telluride, where visits were made to several noted mines. On August 23 the party went to Silverton, a number of its members crossing the ranges on horseback via Red mountain.

At Silverton the party visited the Silver Lake mines under the guidance of Manager S. I. Hallett.

Those composing the party were Professors Emmons, Van Hise, Colvin of Iowa, Eastman of Harvard, Fairchild of Rochester, Grant of Evanston, Chamberlin of Chicago, A. N. Winchell of Butte, J. C. Branner and Newsome of Leland Stanford University, Cal.; J. W. Finch, Colorado State Geologist; Prof. Patton of Colorado State School of Mines; Prof. Lakes of Denver, and Messrs. Bagge of Colorado Springs, George L. Cannon of Denver, Bain of Idaho Springs, C. Hersey of Leadville and V. G. Hills of Cripple Creek. The party returned to Denver to attend the meeting of the American Association for the Advancement of Science.

#### BOULDER COUNTY.

The shaft on the Enterprise at Eldora is down 423 feet and a station has been cut at this point. The property will commence shipping at once. C. Shahan has been succeeded as Supt. by T. L. Lamars, M. E., of Denver.

The Lucky Star, at Wall Street, owned by L. A. Duncan, C. Wise and C. Cheney of Boulder, has struck ore which, unsorted, is shipping ten ounces to the ton by the carload.

The Little Giant, at Wall Street, has resumed sinking and is now down 60 feet. The vein is 7 inches wide and is running \$30 to the ton. The owner of the Giant is the Ramona M. Co., G. E. Brown of Woburn, Mass., being managing director.

The Concord tunnel is being steadily driven. It is in 400 feet and producing ore. The vein is 2 feet wide and assays from \$6 to \$225 per ton. The owners are P. J. Werley and F. Eldridge.

The Wood Mountain M. Co. have completed the improvements for mill and increased mining at Wall Street. They have put in a hydraulic power plant. A 24-inch steel pipe line has been laid for 2300 feet, and water wheel and compressor erected. The company has completed a series of explorations with diamond drill, and the results of their boring are considered satisfactory. They will have from 100 to 150 H. P. to drive the machinery.

#### CLEAR CREEK COUNTY.

Missouri and Boulder people are interested in the Wizard G. M. Co., which is operating near Central City, with Farnsworth Bros. in charge. The company has twelve claims under development through a tunnel under construction. Farnsworth Bros. report that the tunnel has cut four leads.

The Heddensberg mine, near Idaho Springs, which has been closed down for a long period, is about to be started up again. The company will sink a shaft to

connect with their tunnel, which is in nearly 500 feet.

F. J. Alexander says work is going on uninterruptedly on the Specie Payment mine at Idaho Springs. The weekly shipments amount to twenty-five tons of smelting ore averaging \$85 a ton and fifty to seventy-five tons of milling ore worth \$7 a ton. The deepest workings are 500 feet and drifts on the vein show the latter to be from 3 to 25 feet wide. The property is to be equipped with electric drills.

At the Sleepy Hollow mine, near Black Hawk, the Sleepy Hollow M. Co. expect to begin development work, which includes the sinking of the shaft, now 900 feet deep. It is reported that J. Carls will have charge of the underground work.

#### DOLORES COUNTY.

W. A. Miller has sold his one-half interest in the River View tunnel and mine at Rico to D. Swickhelmer. It is understood that the Southern M. & M. Co. are the real buyers and will eventually take the mine. The Southern now practically controls the Kearney and Ninety-eight claims, worked through the River View tunnel; and with this last buy they will own a controlling share of the entire ground and properties on that portion of C. H. C. hill.

#### FREMONT COUNTY.

(Special Correspondence).—The Rocky Mountain smelter is closed down, pending the putting in of roasters to desulphurize certain grades of pyritic ore which comes from camps other than Cripple Creek. A large and well-equipped refinery is also being erected, which will have all the up-to-date features. F. W. Draper of McGill University, Montreal, Canada, is superintending the construction of the refinery. Florence, Aug. 23.

#### GILPIN COUNTY.

Denver parties are interested in the Monitor tunnel property on Dory hill, near Black Hawk, under the management of G. F. Lewis of Denver. The tunnel has been driven 175 feet, showing a streak of lead ore averaging from 4 to 8 inches in width.

The Mida M. & M. Co. has been incorporated, capital \$50,000, with A. M. Berry, Denver, president, and E. C. Miles, Black Hawk, secretary and treasurer. It has been organized to work the Russell Hill mine, which has been developed by a tunnel from which an incline shaft is to be sunk on the vein. Ore shipped has given values as \$58 per ton. The company will commence development work at once.

The Electric Spark M. Co. has commenced work on the Grace Darling property, in Lake district, near Central City, and is sinking a new shaft at 25 feet depth. A 2-foot vein has been cut which assays well. The company will sink 75 feet at once and will build a 20x40 shaft building for a gasoline hoisting plant, which will be placed on the mine soon. This property has not been worked for a number of years. Omaha capitalists are operating this mine with J. A. Yawger as manager.

At the Senator mine, near Black Hawk, the 22x50 addition to the shaft building has been completed. Drifting is being done in the 200-foot east level. G. W. Schneider of Central City is manager for A. Radel of Bridgeport, Conn., and J. Steiner of Denver, who have a lease and bond on the property.

The Hillhouse M. Co. at Central City, Simonds manager, is installing a gasoline hoisting engine plant on the Hamlet shaft, on which a new building has just been completed. The shaft on this property has not been worked for many years, but is down 455 feet.

#### GUNNISON COUNTY.

F. J. Mott of Denver has begun to operate the Independence property at Gunnison. A good vein of silver-lead ore is showing in the main shaft.—Pennington Bros. of Gunnison are operating a mine on Ruby peak.—The Ruby Chief mine, operated by the California-Colorado Shareholding M. & M. Co., is to soon resume operations.

#### HINSDALE COUNTY.

The tramway and concentrating mill construction at Lake City for the Hanna M. & M. Co. will be commenced at once. Mr. Dewey, formerly of the Hidden Treasure mine at that place, will be Supt. The tramway will be about 4700 feet long, and will cross over the surface of the Mineral Farm group of mines. The mill will be built on plans made by Mr. Dewey, and will have an initial capacity of fifty tons per day.

#### HUERFANO COUNTY.

G. H. Utter, geologist, has been examining the country along the copper belt near La Veta for Eastern people.

R. Deeds of La Veta has relocated an old property and, backed by a company at Elgin, Ill., expects to do considerable work on it.

#### LAKE COUNTY.

Sheedy & Kountze of Denver, who are at the head of the Nubian M. Co., which is opening up a claim at Leadville, have, in addition to a fine iron and lead ore chute, a fine streak of hard carbonate, which is very rich in chloride. Considerable of the ore has been shipped. The streak is not very wide, but runs from 1000 to 2000 ounces silver to the ton.

At the Hoffer shaft of the Big Evans M. Co., which is to be extended to the lower levels, a large plant of new hoisting machinery is to be installed. The shaft is being sunk for a high-grade ore body discovered by diamond drill prospecting below the present levels.

At the White Cap, Leadville, where new prospecting work is being carried on, J. Shinn is manager for Eastern people. At a depth of 700 feet a drift is now being run to open up the sulphide ore zone.

#### MINERAL COUNTY.

(Special Correspondence).—The Ridge mine has been worked for the last three years under lease to A. E. Reynolds of Denver; Geo. N. Nichols of Del Norte, Colo., is the principal owner. The aforesaid lease expires Dec. 25, 1901, and it is presumed the closing down of the mine last week was due to the fact that the lessee did not care to go on with needed development without assurances of renewal of lease. The Ridge has been a producer for the past ten years, and during recent years has shipped an average of 200 tons of concentrates per month. Those shipped within the last three months are said to have run 80% lead and three to five ounces silver. The mine is opened through a 500-foot tunnel, a 500-foot shaft sinking on the vein from near the breast of the tunnel. Drifts in ore have been run on five levels; continuous production requires new development work.

The Solomon, Ethel and Moses are operated under one management. Most of the product of the three is concentrated at the Ethel mill, of which J. A. Smith is Supt. The monthly output of this mill is about 150 tons of lead concentrate and 225 tons of zinc concentrate. The interesting feature of the work is the successful separation effected of the lead from the zinc. The work is done by Hartz jigs, sizers devised by Supt. Smith, and Willey tables. The sizer product consists of flour lead and flour zinc, which go to the table for separation. The heavy, coarse lead is a jig product; the zinc, which is of lesser specific gravity, passes from the jigs to the sizers, the latter having a sixty-mesh screen that catches the flour-fine zinc and lead. The four jigs run forty-five to fifty tons per twenty-four hours. These mines furnish at least five grades of ore, the difference being mainly a matter of specific gravity, quantity of iron, silica, lime and spar. The elimination of the lime appears to be one of the difficult features of the work. The zinc concentrate, which averages about 55%, is shipped to Joplin, Mo.; the lead concentrate will average about 75% Pb.

Creede, Aug. 17.

Z. Wilson, lessee on the Kentucky Belle, near Creede, is shipping fifteen to twenty tons of ore per month that runs well in bromide of silver.

#### OURAY COUNTY.

A. N. Humphries and associates, who have been working all summer on No. 1 and No. 2 mines, on the north side of Mt. Hayden, near Ouray, have struck a vein which assayed seventy-six ounces in silver to the ton from the No. 1 and twenty-eight ounces from the No. 2.

#### SAN JUAN COUNTY.

(Special Correspondence).—The Gold King, at Gladstone, on Cement creek, is operating steadily on about 200 tons of ore per twenty-four hours, reducing that tonnage to forty tons of concentrate, the latter containing about 11% silica, 30% to 35% iron and a small per cent of lead. It is stated, however, that there is an increase of lead in some portions of the mine as depth is gained. In the concentrate values the gold stands first, silver second and copper third. A small valuation is saved on the amalgamating plates.

The mill has eighty stamps that drop at the rate of ninety-eight per minute and thirty-eight Frue vanners ranged in two rows in a vanner-room 40 feet wide by 210 feet long. The tables which handle the coarse material are given a speed of 208 revolutions per minute, those handling the middlings 194 and those carrying the slimes about 180. At the tail end of the plates below each 10-stamp battery is a box that receives the entire discharge, and within it is a centrifugal pump which sends it to a trough that discharges into hydraulic sizers, separating into three sizes for the tables. The concentrates are shoveled into carriers which convey them to the drying room, which consists of a metal floor, beneath which is a chamber

heated by exhaust steam from the boilers. The concentrates are spread over this floor for about fifteen hours, which reduces their moisture to about 4%. In the winter season the mill is heated by exhaust steam.

A belt conveyor delivers the ore from the No. 4 Gates crusher to the various bins over the batteries. The mill machinery is driven by a Westinghouse compound upright engine.

The mill is supplied with ore by two aerial tramway lines—one 5430 feet long, from the Gold King proper, and the other 3400 feet long from the American tunnel, which is a part of the same group. Both operate by gravity.

The American tunnel is driving for a point 900 feet below present Gold King workings, which it is expected to reach within three months. Its length will then be 1800 feet. The breast of this tunnel and the upper workings will be connected by an upraise. The tunnel that starts at the mill, and is being driven toward the Gold King proper, is now in 1400 feet, but has over 4000 feet yet to be driven. When complete, it will cut 1500 feet below present Gold King workings.

The Silverton, Gladstone & Northerly Railroad, virtually a part of the Gold King property, has been the means of advancing development along Cement creek and on Red and Bonita mountains by the satisfactory transportation facilities it provides.

The entire Gold King consolidation is under the management of W. Z. Kinney. The directors are mostly Eastern men, of whom Messrs. Davis and Soule of Boston, Mass., are among the most active members.

Gladstone, Aug. 24.

#### SAN MIGUEL COUNTY.

Manager J. H. Shockley, for the Four Metals M. Co., has made the final payment of \$14,000 on the Palmyra group, near Telluride. Watton & Dowd, who located the property several years ago, were the sellers. The Palmyra vein, in addition to development made by former owners, has been opened at an increased depth of several hundred feet by a cross-cut driven by present owners. Regular shipments of first-class ore are being made, but a milling plant is essential to the handling of the second-class stuff. This, it is stated, will be built next year. The same company has recently acquired the Andrus and Aztec mines, in Ingram basin, and development work is now being done on both.

#### SUMMIT COUNTY.

Robinson is to have a new pyritic smelter. Mr. De Vall of New York is employing forty men on the construction of the plant. The grading for the buildings is already being completed and a kin of bricks is being burned for the stacks.

#### TELLER COUNTY.

The Wild Horse strike at Cripple Creek is proving to be very rich. Returns received from twenty-two tons give its value at nearly \$200 per ton. The rich ore has been opened in two levels, of which it is showing up well.

The production of the Elkton at Cripple Creek for August will be the largest in the history of the mine, reaching 2500 tons of ore, nearly all of smelting grade. On the 700-foot level the drift has gone for 150 feet, showing 7 feet of an ore body that will ship at from \$75 to \$100 a ton.

The Maybel Co., near Lawrence, will install an electric hoist and sink the shaft for about 800 feet to reach the mineral bodies exposed in the operations conducted through the old works. This property is owned and operated by one of the sub-companies of the Woods Investment Co. of Colorado Springs.

C. J. Williams and associates have taken an eighteen months' lease on the main workings of the Pinnacle Co.'s property near Cameron. Work has been commenced by the lessees. The Pinnacle Co. has decided to lease all of its property not in operation at present.

The Blue Bird Co. at Victor has given the contractors an order to go 100 feet farther to the 1100-foot station in the shaft. The vein has not been reached on the 1000-foot level, but the crosscut is still being advanced.

J. B. Cunningham of Cripple Creek has leased the Hobo claim of the Katinka group at Cripple Creek. There is a 70-foot shaft on the mine, but he expects that it will be necessary to go 250 feet deeper before encountering ore.

The Mount Pisgah M. & M. Co., operating in High Park, near Cripple Creek, is rearranging machinery in their cyanide plant. The company intends heating the solution and will use a pneumatic process. The ore runs from \$10 to \$20 to the ton in gold.

All work has been suspended temporarily on the Wilson and Pinto of the Free Coinage, the controlling interest in which was held by the late S. Strong. The property has been worked under leases,



which end about Jan. 1st next. The July output was about 500 tons; gross value, \$20,000 to \$25,000. Plans for extensive improvements on the mine had been made. A new shaft and ore house were planned, and the old Pinto shaft was to be enlarged to a depth of 1500 feet. A hoist, three tubular boilers and an air compressor were to have been installed. What will be done now is not known. Hunter & Trimble of Leadville own largely in the mine.

## IDAHO.

## ELMORE COUNTY.

Lime Creek G. M. Co., Ltd., has been incorporated, with office at Mountainhome; capital, \$150,000. The directors are E. P. Cowan, W. F. Smith, J. M. Cowan, E. C. Helfrich and R. W. Smith—all of Mountainhome.

## IDAHO COUNTY.

A. Fralik and W. R. Grosse of Boise have bonded the Corder & Beck mine, in the Neal mining district, and are developing it. There are three ledges on the mine, with a tunnel 165 feet in on one of them—all in pay ore. It is proposed to explore the property this fall and install a mill before winter.

## KOOTENAI COUNTY.

The wagon road to the Buckhorn mine, near Bonner's Ferry, has been completed. The building of the stamp mill will be pushed. The mill will be set up with twenty stamps at the start, but provision is made for the addition of thirty more later. E. J. Foster is president of the Hoosier Boy G. M. Co., owning the mine.

## OWYHEE COUNTY.

The Poorman mine, at Silver City, is arranging to have an electric pump installed.

## SHOSHONE COUNTY.

The United States M. Co., Ltd., has been incorporated at Wardner by A. Page, H. France, G. Sonnemann, H. Deitrich and W. H. North, who are the directors. The capital stock is \$100,000.

The Sonora M. Co. has let a contract to continue its tunnel at Wallace and work has been resumed.

The California Con. M. Co. has been incorporated by J. Viles Jr. and A. E. Hedstrom of Chicago, Ill., F. S. McGraw of Buffalo, N. Y., J. P. Keane and A. H. Featherstone of Wallace. Buffalo, N. Y., is the principal office, with branches at Chicago and Wallace. The capital stock of \$1,000,000 is paid up by the deeding to the company by the incorporators of the California and Black Cloud groups of lodes, mill sites, water rights and concentrators at Wallace. Preparations are being made to commence work on the property.

Rice & Foss have bonded the Alice group of twenty claims on Ruddy gulch, near Mullan, to Col. Dewey of Nampa. Preparations are being made to do work on a large scale.

J. Dean and S. P. Smith have sold their Ruddy gulch property to F. Russell and A. G. Kearns of Wallace for \$5000.

## MICHIGAN.

## HOUGHTON COUNTY.

The plant operating on the Franklin tailing sands has been doubled in capacity. The plant is now treating 600 tons of old stamp sand daily with good results in copper. Supt. Mays, who was the original promoter of the plant, is said to claim that the process is a success and states that the company has decided to build an entirely new plant of the same capacity as that now in operation. Work on the new plant will be started by Sept. 15, and the buildings will be rushed so as to be inclosed before the snow flies.

## MONTANA.

## FERGUS COUNTY.

A survey has been made on the New Year mine, at Gilt Edge, for a 1000-foot tunnel, with a 350-foot upraise, work on which will be commenced at once. The mill has been idle for some time, but with the completion of the tramway under construction is expected to be running again to full capacity, 260 tons per day.

The New Year Gold Mines Co. have bought of J. L. Harmon for \$10,500 the Bach and the Kid quartz mining lodes in the Warm Spring mining district, near Gilt Edge.

The Abbey mining claim in the North Moccasin district, has been bonded for six months by F. S. Akely to J. R. Cook of Spokane, Wash., and extensive developments will begin at once.

## GRANITE COUNTY.

C. Smith, who, with Baggs & Royal, is working the extension of the Lead King mine at Garnet, says there is considerable work being done in and around the Garnet district, and some good ore is being taken out of the various properties.

## MADISON COUNTY.

The Kearsarge at Virginia City has

been bonded by W. B. Millard of Omaha, and is being operated under C. E. Dammours, manager. There is a 12-foot body of ore in the mine, which is worth \$65 a ton, and other workings in the mine show up equally promising. Arrangements for the reduction of the ore are to be made.

The General Shafter mine at Summit has been located on an extension of the Keystone lode. The managing operators are R. R. Smith Supt., T. H. Teal chemist, C. W. Sherwood and H. S. Ribbel millmen. The company has just built a 5-stamp mill and cyanide plant of forty tons daily capacity.

The Montana M. Co., with office at Marysville, has taken a lease and bond at \$100,000 on the Lester mine near Twin Bridges. The mine is owned by Jeffries & Armor and is a high-grade cyaniding proposition. The owners have opened up a 12-foot lead 265 feet by a tunnel 480 feet long. The new management will add new machinery and more fully develop the property.

The owners of the Mammoth properties on South Boulder, near Virginia City, have decided to build reduction works of more larger capacity and more modern appliances. It is also stated that the same men propose building a matte smelter.

The South Boulder M. Co. has machinery for a 10-stamp mill at its mill site at Mammoth, and expect to have it operating in October. This company is composed of Montana and Minnesota people.

## MEAGHER COUNTY.

G. E. Wiltse has struck 9 inches of copper glance on his claim at Copperopolis, close to the surface, in doing assessment work.

The ore from the iron mine near Copperopolis is said to run at the smelter 65% iron and 3% silica.

## SILVER BOW COUNTY.

The Butte & Iowa M. C. at Butte, recently incorporated, is beginning operations on the Colorado claim. It has put machinery on the mine after sinking the shaft to the water level. Sinking will be continued 500 feet and deeper if ore is struck. The work is in charge of J. Hewett, formerly foreman at the Gagnon. The principal stockholders are H. Mueller, E. Carroll, G. A. Cobban, J. A. Talbot and J. S. Shropshire.

## NEVADA.

## LANDER COUNTY.

The Dexter M. Co. has bonded at \$1000 the Pinto ground, near the mine which it is working. It is now reported from the mine at Tuscarora that from a single hole which had been shot into the Pinto, they had in a single shift taken out enough to pay for it. The new ground, which had been long worked as a placer, had been neglected for several years, and only taken up by the Dexter Co. because it was cheap and a chance.

## LINCOLN COUNTY.

The Arctic, Baltic and St. Lawrence mining claims of Searchlight have bonded to G. S. Wilson of Glasgow, Scotland, at \$20,000, of which sum \$2000 has been paid. The mines in the Copper King district, near Bunkerville, are working about twenty men and development continues increasing the showing of the property. The deepest working is now 200 feet below the surface. Supt. L. C. Bradley is pushing work on the several properties and states that a smelter is projected.

## WHITE PINE COUNTY.

A run of 13,000 pounds of ore belonging to R. Culver, taken from the Joana mine of Cocomongo, and treated at Ely, worked up to over \$120 per ton. Mr. Culver states that after paying for the hauling of this ore 16 miles and for the milling and for other expenses he had left over \$10 per day for wages.

## NEW MEXICO.

## SANTA FE COUNTY.

J. Blonger, of Santa Fe, has contracted with A. R. Gibson to sink a shaft 100 feet and drive a tunnel 100 feet on the Jones copper mine, 14 miles southeast of Santa Fe.

## SIERRA COUNTY.

B. S. Phillips, G. M. Miller, E. DeSoto and H. P. Lowe of Denver, Colo., have incorporated the Black Range G. M. Co., capital \$1,000,000, with office at Fairview; field of operation in Socorro and Sierra counties. The directors are T. Scales, B. S. Phillips, G. M. Miller, E. D. DeSoto and H. P. Lowe.

E. F. Pearson, of Santa Fe, has bought the Mamie Richmond gold-copper mine, located in the Hillsboro district.

## OKLAHOMA.

From Lawton it is reported that the oil excitement has superseded everything else, over a hundred oil claims being filed in a single day. Over a thousand mineral claims have been made, many of them copper claims. Native copper in two in-

stances has been found. Three springs from which oil flows constantly have been located, and in four places asphalt has been found oozing from the ground. Both liquid and solid asphalt have been found in a number of shafts. There is general ignorance of the mining laws among the majority of claimants, and it is said not one-third of the mining claims are properly marked. The richest mineral developments are in the western end of the Wichita mountains, on Otter creek. Here are found gold, silver, copper and zinc, and a mining district has been organized and a recorder elected, where all claims for the district will be filed.

## OREGON.

## BAKER COUNTY.

J. H. Stallings and J. T. Hudson of Salt Lake City, Utah, have bought the L. C. Van copper mines for \$10,000. The Van property consists of five claims, about 18 miles northeast of Baker City. Little development work has been done on the property, but there is a large body of ore exposed at the surface.

At the Maxwell mine, on Rock creek, near Baker City, owned by Pierce Bros., tunnel No. 14 is now in 500 feet and the ledge is averaging 4 feet wide. The 10-stamp mill has been started up, operating by water power under 200 feet head. Foreman Reeves is now employing twelve men. Between 4000 and 5000 feet of work has been done. There are twenty-eight claims belonging to the property.

W. W. Travillion and P. Mann have sold their placer and quartz ground in the Winterville district, near Baker City, to J. A. Dubbs of Denver, Colo., and C. F. Trump of Kahoka, Mo. The price paid for the property is understood to be about \$40,000. The property transferred comprises 390 acres of placer ground, four quartz claims, 44 miles of ditches and water rights in the Winterville and Bonanza districts. The company intend to incorporate at Salt Lake City under Utah laws. It is understood that extensive development of the mine will be begun at once.

It is reported that, while excavating in Whitney in the streets, a rich quartz ledge of free-gold ore was struck.

The Oregon M., D. & L. Co. has been incorporated in Salt Lake City, to operate mining properties, mills and smelters in Baker and Grant counties, Or. The capital is \$1,000,000. C. T. Trump is president and N. M. Vedder secretary of the company.

## GRANT COUNTY.

W. J. Patterson of Baker City and G. J. Barrett, owners of a number of claims near Granite, have bonded them to Illinois people, and men will be put at work on the property as soon as buildings are erected for boarding house and blacksmith shop. The price is understood to be \$40,000 and a large block of the stock of the company to be incorporated.

## JACKSON COUNTY.

From the two upper levels of the Dixie Queen mine, near Gold Hill, ore is being milled that averages \$100 to the ton. This rock was not from the stopes, but was that taken out in opening the tunnels. J. Fitzgibbon, the owner, is having a third and lower tunnel run to cut the ledge 400 feet down.

## JOSEPHINE COUNTY.

The Scribner-Henderson gold mine, on Wolf creek, near Grant's Pass, is worked by panning entirely. The gold is found in seams and stringers of decomposed quartz in porphyry at a serpentine contact. The rock, crushed in a hand mortar, pans from 25 cents to \$100 a pan, and in the nine months of operation a very large sum has been recovered.

The rich strike in the Ramsey mine, Mt. Reuben district, near Grant's Pass, is said to be proving richer than was at first anticipated. The ledge was tapped by a 60-foot tunnel, and at the point where the tunnel cut the ledge, a 5-foot vein showing free gold through the whole ledge has been opened up. The Ramsey mine was lately bought of J. Ramsey by J. C. Lewis and R. Jones.

J. R. Harvey, manager of the A. & B. mine and Old Channel mines, near Grant's Pass, is having the mines put in shape for next season's operations. At the first-named mine about thirty men are employed.

## SOUTH DAKOTA.

## CUSTER COUNTY.

The New York mica mine, near Custer, owned by C. A. Dow of Sioux City, Iowa, has been bought by B. H. Sullivan of Chicago, Ill., for, it is reported, \$50,000. The ledge of mica-bearing quartz is over 40 feet wide and it yields large blocks. The mine has been thoroughly developed and is shipping.

R. O. Ball of Denver, Colo., has been in the Harney Peak tin district in Pennington and Custer counties, getting together a large area of tin-bearing properties for

the Glendale Tin M. Co. of London, Eng., which has been reorganized and is to commence work immediately.

## PENNINGTON COUNTY.

A ledge of pyritic ore has been struck at Deadwood by J. T. Gillmore and associates. It runs well in gold, copper and iron, and makes a good flux for the Deadwood smelter. The ledge is over 40 feet wide. Across the gulch about ninety tons of this same character of ore are being shipped daily to the Golden Reward smelter for a flux.

Supt. Fillion of the Pluma M. Co. says work on their shaft will be resumed soon. From work done on the tunnel it is known that the shaft will strike a body of free-milling ore 250 feet down. The company expects to get water from the shaft at the 300-foot level to supply a mill.

## TEXAS.

## EL PASO COUNTY.

The Sunset and Buenos Ayres M. Cos., operating in Chihuahua, Mexico, have decided to erect the smelting plant in El Paso to get the advantage of railroad connection. S. L. Pearce, of Chihuahua, the general manager of the two mining companies, has plans all complete for a fifty-ton plant and says that the companies represented in the enterprise have sufficient mines in Mexico and Arizona to operate a smelter of that size but propose to do a general custom business besides.

## UTAH.

## BOX ELDER COUNTY.

A contract for a 500-foot tunnel on the Planetary at Park valley is to be let at once, and the site will be located by P. W. Madsen and J. B. Toronto, of Salt Lake City. Mr. Madsen will also let a contract for a 300-foot tunnel on the Ione.

The Delta M. Co. has been incorporated with \$50,000 capital. The company owns the Hanky Panky and five other mining claims in this county. P. Williams is president and E. O. Lee secretary and treasurer, with office at Salt Lake City.

The West Side M. Co. has been incorporated, capital \$30,000. S. Golding is president, A. C. Newell vice-president and O. D. McIntire secretary and treasurer of the company, with office at Standard, Idaho. The company owns the West Side group in Park valley.

## IRON COUNTY.

W. Jones of Salt Lake City has bonded all the claims on Iron mountain on behalf of Eastern people. In the aggregate the vendors are to receive \$300,000, or 10% of the purchase price, on or before October, the balance to be paid by January 1 next. If the proposition is sold there will be begun an iron smelting and steel making plant.

## JUAB COUNTY.

E. A. Wall of Salt Lake City has leased and bonded the Sioux and Utah claims at Tintic from R. D. Grant, who bought them from F. D. Farrel of Ansonia, Conn. The price named in the bond is said to be about \$500,000, as the claims cover 4500 feet along the strike of the vein of the Humburg and the Carisa.

An examination of the American Star and Blackbird claims at Tintic has been made by P. Ryan of Salt Lake City and J. T. Keil, representing the Pittsburgh, Pa., owners, and development is expected to follow in a short time.

The St. Louis mine at Tintic, owned by G. Bridges, has been incorporated as the Eureka-St. Louis M. Co. W. Hedrick is president, G. T. Bridges vice-president and J. W. Hatfield secretary.

## PIUTE COUNTY.

The Silver Cave property, near Marysville, is to have development work done on it at once. A. Jensen, manager, has started to run a 50-foot tunnel. W. E. Thurber of Richfield and O. Lee of North Monroe have leased their mine, near Marysville, to W. E. White of that place.

## SUMMIT COUNTY.

B. Hartwell of Park City has sold the Hall group of claims, situated near Park City, to P. A. Simpkins and associates, who are intending to develop the property. They are incorporating under the name of the Thayne's Canyon M. Co.

## WASATCH COUNTY.

The Wolverine M. Co. has been incorporated, capital \$150,000. M. L. Effinger is president and D. H. Peery, Jr., secretary and treasurer, with office at Salt Lake City. The company owns the Natural Arch group of five claims, in Snake Creek mining district, in Wasatch county.

The Potter Graystone Co. has been incorporated, capital \$300,000. G. R. Potter is president and E. D. R. Thompson secretary; office at Salt Lake City. The company owns the Emma's park graystone quarry placer mining claim and the Willow Creek graystone quarry placer mining claim, in Carbon and Wasatch



counties, from which the company proposes to quarry and sell stone.

The Pearl Silver M. Co. has been incorporated; capital, \$15,000. The company owns the Pearl J. C. and the George H. C. mining claims in the Blue Lodge mining district. J. Hatch is president and A. C. Hatch secretary, with office at Salt Lake City.

#### WASHINGTON.

##### FERRY COUNTY.

A body of copper ore has been opened on the Lucille Dreyfus, near Nelson. About 100 tons of ore have been taken out in development, which sampled \$27.50 gross and \$14.50 net after deducting smelter charges. B. E. Miller, president of the company, is arranging to make a shipment. A contract has been let for building  $\frac{1}{2}$  mile of road to connect the mine with the main wagon road to Grand Forks, B. C.

##### OKANOGAN COUNTY.

H. S. Stoolfing, manager of the Interstate M. & M. Co. of Spokane, is superintending work on the company's mine at Chelan. The company has let a contract on the Delate claim and the contractors are now down 40 feet. The vein is 4 feet wide and shows high-grade galena ore.

##### STEVENS COUNTY.

The Rambler mine at Springdale, which was recently opened up, is said to show over 7 feet of high-grade copper ore. J. Wolf, S. Emmerson and P. C. McGrath are the owners, and are making arrangements to open up the mine extensively.

Moore & Kern have bonded the Henshaw claims, near Springdale, for \$25,000 and are doing considerable work. They will build a road preparatory to shipping ore immediately.

#### WYOMING.

##### ALBANY COUNTY.

The Michigan copper mine in the McArthur group, near Laramie, has been sold to a company composed of J. H. Wear of Boone, Iowa, A. M. Ross of Cincinnati, Ohio, W. A. Whitney, F. H. Eggleston of Laramie and T. J. Cramer. The price is said to be \$10,000, 10% having been paid.

##### CARBON COUNTY.

Manager Miller has started up work on the Dangier C. M. Co.'s mine, after a shut down of several weeks. Eight men are employed on the tunnel heading, which is in 210 feet. An average of 2 feet advance a day is being made. Arrangements are made for the continuance of work all through the winter.

#### FOREIGN.

##### BRITISH COLUMBIA.

The Prospectors' Exchange of Nelson reports that the Reco-Goodenough properties, Slokan, are being worked together; the main lead runs through both properties. There are about twenty-five men employed. The McGuigan camp is one of the busiest in the Slokan at the present time. The Soho is developing and shipping small quantities of ore. The Antitone is working about ten men. On the Washington work is being pushed in the way of development and having a great deal of ore sacked. The Rambler is shipping steadily and its new concentrator will soon be completed. The Hewitt, Slokan district, is producing about ten tons of ore a day from development alone. Work is well under way in three levels. In the No. 3 level the ore body has widened to 35 feet; part of this can be taken out and sacked on the spot, the rest is concentrating ore. The shipping ore runs from 35 to 60 ounces in silver and from 3% to 6% in lead. There are 500 tons of rich ore sacked at the mine, which is being shipped over the tram. There are forty men employed on the property. The Whitewater now has sixty men working and has about completed the shipment of 1000 tons of concentrates to the Trail smelter. A discovery of cinnabar was made on the Cariboo by T. Edwards and C. Hanson, Greeley creek, about 8 miles from Revelstoke. There are 3 feet of ore exposed on the surface, which is rich in quicksilver. On the Poorman, Ft. Steele, an incline shaft has been run 45 feet in ore; the ledge at 25 feet was 7 feet between walls. The ore is copper carrying high values in silver. P. J. Nichols has bonded the Fern mine, Nelson district. Nearly 1500 feet of tunneling has been run on the ledge, which has an average width of 3 feet. There is a 10-stamp mill on the property. The ore carries gold and the average yield is said to be about \$60 per ton.

Nelson, August 24.

The Speculator group, adjoining the Arlington, in the Slokan, has been bought by a San Francisco company, known as the Ricovillabi M. Co., the stockholders in which include R. P. Rithet of Victoria and a number of San Francisco people. The claims embraced were the Specu-

lator, Speculator Fraction (staked in the survey), Mineral Mountain, Eda Fraction, Empire and Westside. The property has been under a bond which was taken up by the payment of \$49,000.

William Davis, resident director of the Transvaal-Zambesi Co., an English corporation, reports a strike on the company's properties at Erie. A crosscut has cut a wide vein, one of the shoots carrying silver, gold and lead, averaging \$70.

The Thistle G. M. Co. at Cariboo, B. A. Lassell manager, have already cleared \$6000 above all expenses, and from hydraulic mining pay a dividend the first year of their operation. The company have bought a number of claims adjoining their first purchase.

At the Onondago mines on Champlain creek, near Rossland, it has been decided to install water power and a compressor plant and double the size of the 10-stamp mill now erected. The property is owned by Will Bros. of Syracuse and St. Louis. Jones & Scott, from Cape Cormorrell, on the northern extremity of Vancouver Island, say they have found black sand there, bearing gold, and took out \$1100 in two weeks.

#### Personal.

HENRY BRATNOBER of London, Eng., is in Spokane, Wash.

C. E. AND W. LOOSE of Salt Lake City, Utah, are at Houghton, Mich.

P. G. GOW, Supt. Jumper mine, at Quartz, Cal., is in San Francisco.

H. G. LEE of Minneapolis, Minn., is examining mines at Eagleville, Nev.

J. BRESNAHAN of Spokane, Wash., has returned there from Nome, Alaska.

E. R. BUCKLEY of Wisconsin has been appointed State Geologist of Missouri.

W. H. MCCLINTOCK has resigned as Supt. Goldwin mine, near Sonora, Cal.

G. W. CROWE has been appointed manager Arizona G. & C. Co., at Patagonia, Ariz.

L. A. DUNHAM, manager Clifton Con. copper mines, Clifton, Ariz., is in New York.

H. ARMSTRONG of Republic, Wash., has returned to that place from Nome, Alaska.

C. D. JACKLING, late manager Republic Mill, Republic, Wash., is in Salt Lake City, Utah.

T. L. LAMMARS of Denver, Colo., has been appointed Supt. Enterprise mine, at Eldora, Colo.

A. E. SPRIGGS of Butte, Mont., has returned from a visit to Prince of Wales Island, Alaska.

WHITTAKER WRIGHT has resigned the managing directorship of the Le Roi M. Co., Rossland, B. C.

F. GUERRA has been appointed Supt. California King gold mines, at Picacho, San Diego county, Cal.

L. C. PARKER AND G. STEINBERG of Deer Lodge, Mont., are in Prince of Wales Island, Alaska, examining mines.

J. NICHOLS of Georgetown, Colo., is in charge of the mill of the Vacas-San Marcos silver-lead mine, Durango, Mexico.

R. J. FERGUSON of Kingman, Ariz., has been appointed Supt. of the concentrating plant of the Peacock copper mine, Cadiz, Cal.

#### Commercial Paragraphs.

THE American School of Correspondence in Boston, Mass., is claimed to be the only correspondence school in the country making a specialty of steam, electrical and mechanical engineering, heating, ventilating, plumbing and mechanical drawing. A postal card addressed to the American School of Correspondence, Boston, Mass., will procure a handsome handbook, describing its methods and courses and giving letters from graduates, expressing the results of their experience.

THE New Process Raw Hide Co., Syracuse, N. Y., reports that it has been obliged to run its bevel-gear planing machines nights during the last week in order to rush through a number of large bevel-gear wheels to repair a break-down for a big New England wire-drawing concern. The bevels are of cast iron, with teeth planed accurately to cone lines and are to take the place of cast gearing.

H. J. PUTMAN & Co. of Minneapolis, Minn., manufacturers of the Putman boots, state that their trade, especially among mining and civil engineers, has increased very rapidly during the past year, and that they are selling large quantities of their goods in nearly every civilized country of the world. They say that all Putman boots are made to measure, and the thoroughly equipped factory admits giving each pair the personal attention of a custom order. In connection with their

catalogue describing over thirty different styles of boots, adapted to hunters, engineers and prospectors, Putman & Co. are sending out a circular giving illustration of two special boots, particularly for use by mining engineers and persons employed in mountainous and rough country, illustrated and described, of interest to any engineer, and can be had upon application.

#### New Patents.

DEWEY, STRONG & Co.'s SCIENTIFIC PRESS PATENT AGENCY, 330 Market St., S. F., has official reports of the following U. S. patents issued to Pacific coast inventors:

FOR THE WEEK ENDING AUGUST 20, 1901.

681,005.—SOLAR OVEN—M. M. Baker, S. F.  
680,833.—WATER MOTOR—Banning & Carey, Los Angeles, Cal.  
680,762.—CAN FILLING MACHINE—F. E. Caton, San Jose, Cal.  
680,816.—PLOW—W. M. Dowden, St. John, Cal.  
680,914.—BRICK KILN—Gray, Gray & South, S. F.  
681,169.—FRUIT PICKER'S SACK—A. Hamilton, Alhambra, Cal.  
680,859.—CLAMP—Hassler & Watters, Oakland, Cal.  
680,917.—COVER FOR KETTLES, ETC.—C. H. S. Helling, Alameda, Cal.  
680,918.—TRACTION ENGINE—J. E. Harris, Saratoga, Cal.  
680,919.—TROLLEY GUIDE—Geo. F. Heuser, Portland, Or.  
680,925.—CAN HOLDER—J. F. Kieley, San Jose, Cal.  
680,720.—SIGN—L. R. LeLande, Los Angeles, Cal.  
681,059.—LOOMS—J. H. Northrop, Tustin, Cal.  
680,938.—CONCENTRATOR—A. B. Paul, S. F.  
680,886.—WHEELED SCRAPER—C. Rath, Los Angeles, Cal.  
681,146.—HAY FORK—F. M. Standley, La Grande, Or.  
680,917.—PHOTO MOUNTS—P. J. Stuparich, S. F.  
680,910.—FRICTION CLUTCH—E. Turney, Portland, Or.  
680,822.—LOGGING HOOK—A. Wren, Seattle, Wash.  
681,088.—CLASP—Wait & White, Pendleton, Or.

#### Notices of Recent Patents.

Among the patents recently obtained through Dewey, Strong & Co.'s SCIENTIFIC PRESS U. S. and Foreign Patent Agency, the following are worthy of special mention:

COVER FOR POTS AND KETTLES.—No. 680,917 Aug. 20, 1901. C. H. S. Helling, Alameda, Cal. This invention is designed to provide a cover for culinary utensils, which cover has projecting lugs or hooks to engage the edge of the pot, and a lever pivoted eccentrically of said cover with its outer end provided with a projecting lug or hook adapted to engage the edge upon the opposite side where by the cover may be firmly locked upon the pot or disengaged therefrom. A segmental opening is formed upon one side between the hooks which allows the liquid to be poured off while the cover retains the solid contents.

BRICK KILN.—No. 680,914. Aug. 20, 1901. J. F. and H. N. Gray and R. South, San Francisco, Cal. This invention relates to improvements in brick and other burning kilns for similar purposes, and consists in an improved construction of the burning chambers, the arrangement of the brick or wares to be burned so as to provide open combustion chambers, a means for providing oil or liquid hydrocarbon as a fuel in the place of coal or other solid fuel, and a novel arrangement of the passages for connecting the burning chambers with the escape flue so that the "water smoke" is carried away from the "green" material without injuriously affecting the contents of the chamber. It also comprises a means of communication for keeping up the heat and passing from a series of chambers on one side of the kiln to those upon the other so that the corners may be turned without loss of effective heat. Means are employed for supplementing the heat passing through successive chambers and for the purpose of starting a burning in the first instance and thereafter to assist in keeping up the heat in turning corners.

CONCENTRATORS.—No. 680,938. Aug. 20, 1901. A. B. Paul, San Francisco, Cal. This invention is designed for the concentration of black sands, fine metallic copper, sulphurets and like heavy and valuable substances which are associated with lighter and worthless gangue. It consists of a longitudinally guided inclined movable table, with means for producing a longitudinal concussive movement, a closure for the lower end of the chamber, one or more compartments formed in the chamber, and a means for the discharge of the material to the closure, with adjustable discharge gates, and sots or channels made in the bottoms of the compartments, and arranged so that the material of the table. Horizontal plates are adapted to be adjusted upon each side of the slots and above the bottom of the table so as to regulate the flow and discharge of the material.

TRACTION ENGINE.—No. 680,918. Aug. 20, 1901. J. F. Harris, Saratoga, Cal. This engine is designed for traction purposes, and has an endless track so connected with it as to be constantly laid for the wheels to travel upon. Two main drivers are mounted upon a shaft which support the apparatus and rollers are disposed in front and in rear and in line with the drivers, so that an endless track upon each of the sets of wheels, passing around the rollers, is laid for the main wheels to travel upon. Elastic connections between the sections prevent the track from being forced up on soft ground, and keeps the dirt from clogging the spaces between the sections.

TROLLEY GUIDE.—No. 680,918. Aug. 20, 1901. Geo. F. Heuser, Portland, Or. This invention is designed to enable the trolley wheels, carried at the end of a pole upon street and other cars, to be easily replaced upon the conducting wire and disengaged. It comprises two outwardly flaring arms carried by the trolley wheel shaft, weights at the ends of these arms by which they are ordinarily depressed below the line of the wire, an extension by which the movement of the outer ends of the arms below the wire is limited, and means for attaching the trolley cord to this extension, so that the arms are automatically thrown into a vertical position, and are by their divergence they insure a sufficiently wide space to insure the conducting wire being embraced between them and thus directed so as to drop into the groove of the trolley wheel.

#### Latest Market Reports.

SAN FRANCISCO, Aug. 29, 1901.

SILVER.—Per oz., Troy; London, 27d (standard ounce, 925 fine); New York, bar silver, 58 $\frac{1}{2}$ c (1000 fine); San Francisco, 58 $\frac{1}{2}$ c; Mexican dollars, 47 $\frac{1}{2}$ c San Francisco, 45 $\frac{1}{2}$ c New York.

COPPER.—New York: Lake, 1 to 3 casks, \$17.25; carload lots, \$17.00; Electrolytic, 1 to 3 casks, \$16.75; carload lots, \$16.62 $\frac{1}{2}$ ; Casting, 1 to 3 casks, \$16.60; carload lots, 16.50. San Francisco: 18. Mill copper plates, 20c; bars, 22 $\frac{1}{2}$ c. London: £66 10s per ton.

LEAD.—New York, \$4.37 $\frac{1}{2}$ ; Salt Lake City, \$4.00; St. Louis, \$4.40; San Francisco \$4.90, carload lots, 5 $\frac{1}{2}$ c 1000 to 4000 lbs.; pipe 6, sheet 6 $\frac{1}{2}$ , bar 5 $\frac{1}{2}$ ; pig, \$5.25. London, £11 15s 9d per ton=2.56 cents per lb.

SPELTER.—New York, \$4.20; St. Louis, \$3.75; London, £16 2s 6d per ton=3.58 $\frac{1}{2}$  cts. per lb.; San Francisco, ton lots, 5 $\frac{1}{2}$ c; 100-lb lots, 6c.

ANTIMONY.—New York, Cookson's, 10c; Hallett's, 9c; San Francisco, 1000-lb. lots, 10c; 300 to 500 lbs., 11c; 100-lb. lots, 13 $\frac{1}{2}$ c.

IRON.—Pittsburg, Bessemer pig, \$16.00; gray forge, \$14.00; San Francisco, bar, per lb., 2.65c in small quantities.

STEEL.—Bessemer billets, Pittsburg, \$24; open hearth billets, \$26.50; San Francisco, bar, 7c to 12c per lb.

TIN.—New York, pig, \$27.50; San Francisco, ton lots, 30c; 1000 lbs., 30 $\frac{1}{2}$ c; 500 lbs., 30 $\frac{1}{2}$ c; less, 31c; bar tin, \$3.35.

QUICKSILVER.—New York, \$51.00 large lots; London, £9 2s 6d; San Francisco, local, \$47.50 \$3 flask of 7 $\frac{1}{2}$  lbs.; Export, \$45.00.

MAGNESIUM.—New York, \$2.90 \$3 lb.; San Francisco, \$3.75.

ZINC.—San Francisco, 5 $\frac{1}{2}$ c; slab, 5 $\frac{1}{2}$ c; bar, 7c; zinc dust, N. Y., 8c.

BABBITT METAL.—San Francisco, No. 1, 10c.

SOLDER.—Half-and-half, 100-lb. lots, 19c; San Francisco, Plumbers', 100-lb. lots, 15 $\frac{1}{2}$ c.

PHOSPHORUS.—F. o. b. New York 50 $\frac{1}{2}$ c 60c \$3 lb.

ASSAY LITHARGE.—San Francisco, 10c \$3 lb. small lots.

BISMUTH.—New York, \$3.25 \$3 lb., \$2.25 50-lb lots; San Francisco, \$2.50 to \$2.75 \$3 lb.

PLATINUM.—San Francisco, crude, \$19 \$3 oz.; New York, \$20.50 per Troy oz.

FERRO-MANGANESE.—Pittsburg, 80%, domestic, \$58.50, large lots.

TUNGSTEN.—New York, \$3.25 \$3 lb., 95c; San Francisco, \$1.15.

FERRO-TUNGSTEN.—New York, 37 $\frac{1}{2}$ %, 32c; San Francisco, 65c (60%).

NICKEL.—New York, 50 $\frac{1}{2}$ c \$3 lb.

ALUMINUM.—New York, No. 1, 99% pure ingots, 35c; No. 2, 90%, 30c to 35c. POWDER.—F. o. b. San Francisco: No. 1, 70% nitro-glycerine, per lb., in carload lots, 15 $\frac{1}{2}$ c; less than one ton, 17 $\frac{1}{2}$ c. No. 1\*, 60%, carload lots, 13 $\frac{1}{2}$ c; less than one ton, 15 $\frac{1}{2}$ c. No. 1\*\* 50%, carload lots, 11 $\frac{1}{2}$ c; less than one ton, 13 $\frac{1}{2}$ c. No. 2, 40%, carload lots, 10c; less than one ton, 12c. No. 2\* 35%, carload lots, 9 $\frac{1}{2}$ c; less than one ton, 11 $\frac{1}{2}$ c. No. 2\*\* 30% carload lots, 9c; less than one ton, 11c. Black blasting powder in carload lots, minimum car 728 kegs, \$1.50 per keg; less car lots, \$2 per keg.

CAPS.—3x, \$5.50 per 1000; 4x, \$6.50; 5x, \$8; Lion, \$9, in lots not less than 1000.

FUSE.—Triple tape, \$3.60 per 1000 feet; double tape, \$3.00; single tape, \$2.65; Hemp, \$2.10; Cement No. 2, \$3.00; Cement No. 1, \$2.65, in lots of 3000 feet and up.

CANDLES.—Granite 6s, 16 oz., 40s., 9 $\frac{1}{2}$ c \$3 set; 14 oz., 40s., 8 $\frac{1}{2}$ c.

OILS.—Linsed, pure, boiled, bbl., 75c; cs., 80c; raw, bbl., 73c; cs., 78c. Deodorized Stove Gasoline, bulk, 14 $\frac{1}{2}$ c; do., cs., 20 $\frac{1}{2}$ c; 86° Gasoline, bulk, 20c; do., cs., 26c; 65° Naphtha or Benzine, deodorized, in bulk, per gal., 13 $\frac{1}{2}$ c; do., in cs., 19 $\frac{1}{2}$ c; Lard Oil, Extra Winter Strained, bbl., 75c; cs., 80c; No. 1 bbl., 50c; cs., 55c. Neatsfoot Oil, coopers' bbls., 60c; cs., 65c; No. 1 bbl., 50 $\frac{1}{2}$ c; cs., 55 $\frac{1}{2}$ c.

COAL.—San Francisco, coast, yard prices: Wellington, \$9; Seattle, \$7.00; Coos Bay, \$5.50; Southfield, \$9.00. Cargo lots, Eastern and foreign: Wallsend, \$8.00; Brymbo, \$7.50; Pennsylvania, hd., \$14.00; Scotch, \$8; Cumberland, \$12; Cannel, \$9.50; Welsh Anthracite, \$12.00; Rock Springs, \$8.50; Colorado Anthracite, \$14.50. Coke, \$16 per ton in bulk; \$18 in sacks.

#### Recently Declared Mining Dividends.

Breece G. M. Co., Colorado, quarterly, 5 cents per share, \$10,000. Sept. 3  
Helena G. M. Co., Oregon, monthly,  $\frac{1}{2}$  cent per share, \$6000. ....Aug. 26  
Rambler-Cariboo M. Co., British Columbia, 1 cent per share. ....Aug. 30  
Standard M. Co., Idaho, monthly, 5 cents per share, \$25,000. ....Aug. 22  
Utah S. M. Co., Utah, monthly, 2 cents per share, \$2000. ....Aug. 31



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| Gold & Silver Extraction Co. of America, Ltd. | 11     |                                 |       |                             |       |                                   |       |
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| Jurs, P. C.                                   | 1      |                                 |       |                             |       |                                   |       |
|                                               |        |                                 |       |                             |       |                                   |       |
| Kent Mill Co.                                 | 16     |                                 |       |                             |       |                                   |       |
| Keystone Driller Co.                          | 17     |                                 |       |                             |       |                                   |       |
| Knight & Co.                                  | 18     |                                 |       |                             |       |                                   |       |
|                                               |        |                                 |       |                             |       |                                   |       |
| Leffel & Co., James                           | 13     |                                 |       |                             |       |                                   |       |
| Leschen & Sons Rope Co., A.                   | 8      |                                 |       |                             |       |                                   |       |
| Lexow, Theodor.                               | 15     |                                 |       |                             |       |                                   |       |
| Leyner, J. Geo.                               | 15     |                                 |       |                             |       |                                   |       |
| Lietz Co., A.                                 | 14     |                                 |       |                             |       |                                   |       |
| Link-Belt Machinery Co.                       | 14     |                                 |       |                             |       |                                   |       |
| Luckhardt Co., C. A.                          | 14     |                                 |       |                             |       |                                   |       |
| Ludlow-Saylor Wire Co.                        | 4      |                                 |       |                             |       |                                   |       |
| Lunkenheimer Co.                              | 18     |                                 |       |                             |       |                                   |       |
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| Macbeth & Co., James                          | 8      |                                 |       |                             |       |                                   |       |
| Macdonald, Bernard                            | 14     |                                 |       |                             |       |                                   |       |
| Madison, Bruce & Sellers                      | 11     |                                 |       |                             |       |                                   |       |
| Main Belting Co.                              | 17     |                                 |       |                             |       |                                   |       |
| Manning's Assay Office                        | 19     |                                 |       |                             |       |                                   |       |
| Marion Steam Shovel Co.                       | 19     |                                 |       |                             |       |                                   |       |
| Marshutz & Cantrell                           | 4      |                                 |       |                             |       |                                   |       |
| McFarlane & Co.                               | 12     |                                 |       |                             |       |                                   |       |
| Meredith, Wm.                                 | 14     |                                 |       |                             |       |                                   |       |
| Michigan School of Mines                      | 8      |                                 |       |                             |       |                                   |       |
| Midland Terminal Railway Co.                  | 19     |                                 |       |                             |       |                                   |       |
| Midvale Steel Co.                             | 19     |                                 |       |                             |       |                                   |       |
| Mine & Smelter Supply Co.                     | 4      |                                 |       |                             |       |                                   |       |
| Miners' Assay Office                          | 14     |                                 |       |                             |       |                                   |       |
| "Mining Investor"                             | 12     |                                 |       |                             |       |                                   |       |
| Modern Machinery & Electrical Co.             | 12     |                                 |       |                             |       |                                   |       |
| Montana School of Mines                       | 8      |                                 |       |                             |       |                                   |       |
| Montgomery Machinery Co., J. H.               | 17     |                                 |       |                             |       |                                   |       |
| Moore & Co., Chas. C.                         | 17     |                                 |       |                             |       |                                   |       |
| Morris, H. D. & H. W.                         | 3      |                                 |       |                             |       |                                   |       |
|                                               |        |                                 |       |                             |       |                                   |       |
| National Iron Works                           | 4      |                                 |       |                             |       |                                   |       |
| Neill, James W.                               | 14     |                                 |       |                             |       |                                   |       |
| Nevada Metallurgical Works                    | 14     |                                 |       |                             |       |                                   |       |
| New Process Raw Hide Co.                      | 14     |                                 |       |                             |       |                                   |       |
| Nicholson, Hudson H.                          | 14     |                                 |       |                             |       |                                   |       |
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| Ogden Assay Co.                               | 14     |                                 |       |                             |       |                                   |       |
| Ogden Short Line Railroad                     | 1      |                                 |       |                             |       |                                   |       |
| Oriental Gas Engine Co.                       | 1      |                                 |       |                             |       |                                   |       |
| Oscoda Consolidated Mining Co.                | 12     |                                 |       |                             |       |                                   |       |
| Otis, McAllister & Co.                        | 1      |                                 |       |                             |       |                                   |       |
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| Pacific Coast Rubber Co.                      | 11     |                                 |       |                             |       |                                   |       |
| Pacific Coast Smelting & Refining Works       | 6      |                                 |       |                             |       |                                   |       |
| Pacific Tank Co.                              | 7      |                                 |       |                             |       |                                   |       |
| Paraffine Paint Co.                           | 9      |                                 |       |                             |       |                                   |       |
| Parke & Laoy Co.                              | 21     |                                 |       |                             |       |                                   |       |
| Parker, A. B.                                 | 1      |                                 |       |                             |       |                                   |       |
| Patent Title & Guarantee Co.                  | 1      |                                 |       |                             |       |                                   |       |
| Paul, Almarin B.                              | 1      |                                 |       |                             |       |                                   |       |
| Pelton Water Wheel Co.                        | 18     |                                 |       |                             |       |                                   |       |
| Pellegrini & Co., A. L.                       | 13     |                                 |       |                             |       |                                   |       |
| Pennington Sons, Inc., Geo. W.                | 18     |                                 |       |                             |       |                                   |       |
| Perez, Richard A.                             | 14     |                                 |       |                             |       |                                   |       |
| Peterson, L.                                  | 12     |                                 |       |                             |       |                                   |       |
| Phillips & Co., Alvin                         | 14     |                                 |       |                             |       |                                   |       |
| Phillips Rock Drill Co.                       | 14     |                                 |       |                             |       |                                   |       |
| Pneumatic Cyanide Process Co.                 | 17     |                                 |       |                             |       |                                   |       |
| Poolethwaite, R. H.                           | 18     |                                 |       |                             |       |                                   |       |
| Fowell Co., Wm.                               | 14     |                                 |       |                             |       |                                   |       |
| Prescott & Eastern Railroad                   | 1      |                                 |       |                             |       |                                   |       |
| Putnam, H. J. & Co.                           | 1      |                                 |       |                             |       |                                   |       |
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| Quick, Jno. W.                                | 12     |                                 |       |                             |       |                                   |       |
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| Rand Drill Co.                                | 15     |                                 |       |                             |       |                                   |       |
| Redington & Co.                               | 1      |                                 |       |                             |       |                                   |       |
| Roots Co., P. H. & F. M.                      | 12     |                                 |       |                             |       |                                   |       |
| Rose, I. Elmer.                               | 14     |                                 |       |                             |       |                                   |       |
| Richards, J. W.                               | 14     |                                 |       |                             |       |                                   |       |
| Ridson Iron Works                             | 3, 12  |                                 |       |                             |       |                                   |       |
| Rix Compressed Air & Drill Co.                | 15     |                                 |       |                             |       |                                   |       |
| Robins Conveying Belt Co.                     | 20     |                                 |       |                             |       |                                   |       |
| Robinson, H. C.                               | 1      |                                 |       |                             |       |                                   |       |
| Roebbling's Sons Co., John A.                 | 12     |                                 |       |                             |       |                                   |       |
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| Rosenberger, A. F.                            | 1      |                                 |       |                             |       |                                   |       |
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| San Francisco Pioneer Screen Works            | 12     |                                 |       |                             |       |                                   |       |
| Schaw, Ingram, Batchelor & Co.                | 20     |                                 |       |                             |       |                                   |       |
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| Selby Smelting & Lead Co.                     | 4      |                                 |       |                             |       |                                   |       |
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| Simonds, Ernest H.                            | 14     |                                 |       |                             |       |                                   |       |
| Simonds Saw Co.                               | 14     |                                 |       |                             |       |                                   |       |
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| Smith & Co., F. L.                            | 19     |                                 |       |                             |       |                                   |       |
| Smith & Co., S. Morgan                        | 18     |                                 |       |                             |       |                                   |       |
| Smith & Co., Francis                          | 12     |                                 |       |                             |       |                                   |       |
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| Stevens, Ralph E.                             | 14     |                                 |       |                             |       |                                   |       |
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| Taylor & Co., P. T.                           | 18     |                                 |       |                             |       |                                   |       |
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| Union Gas Engine Co.                          | 20     |                                 |       |                             |       |                                   |       |
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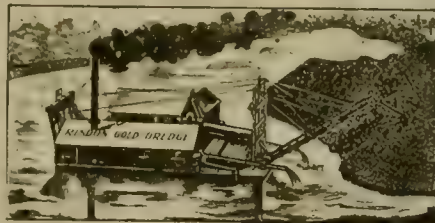
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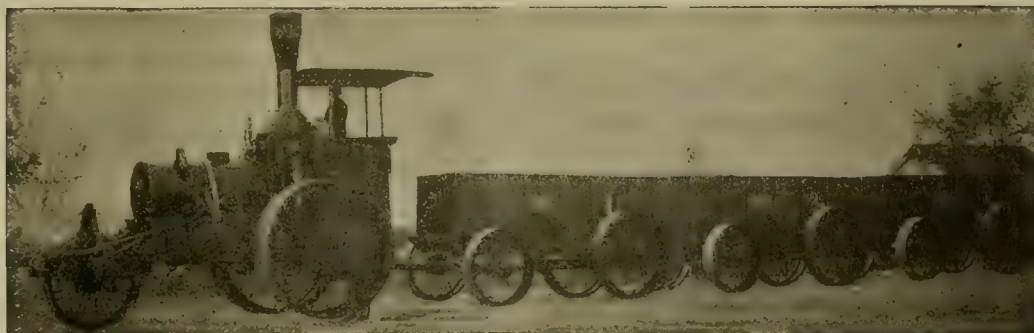


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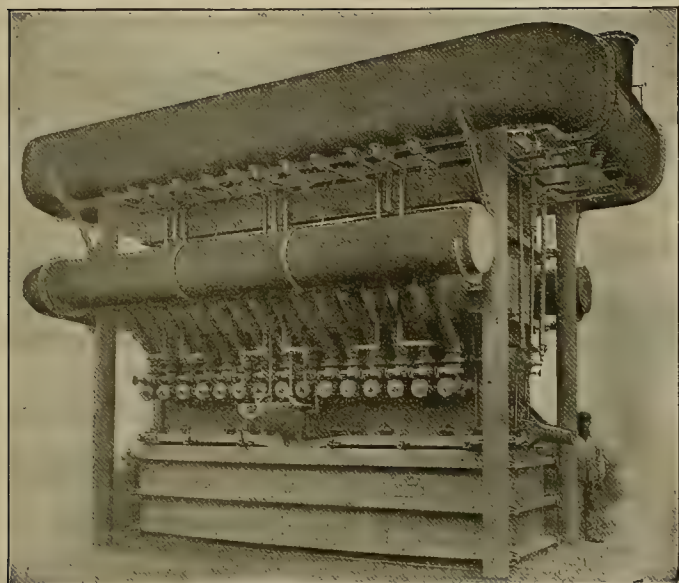
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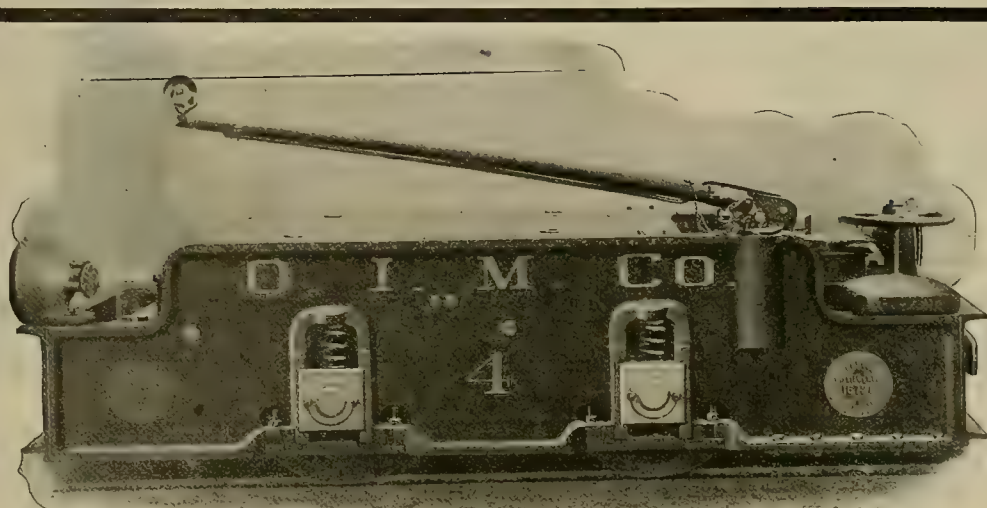
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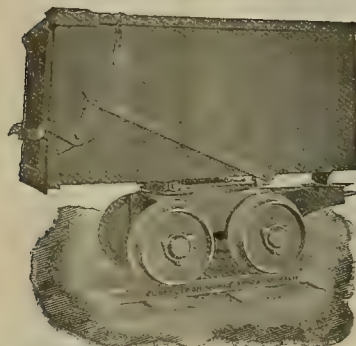
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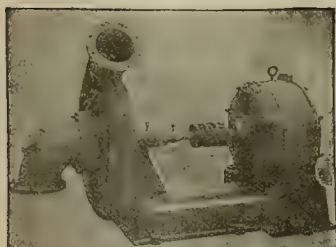
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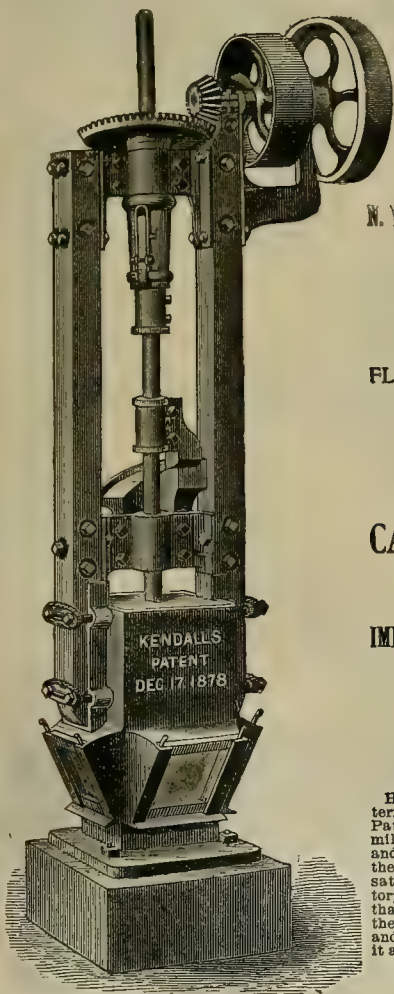
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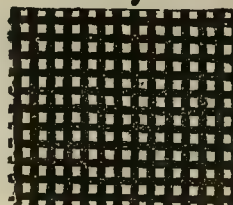
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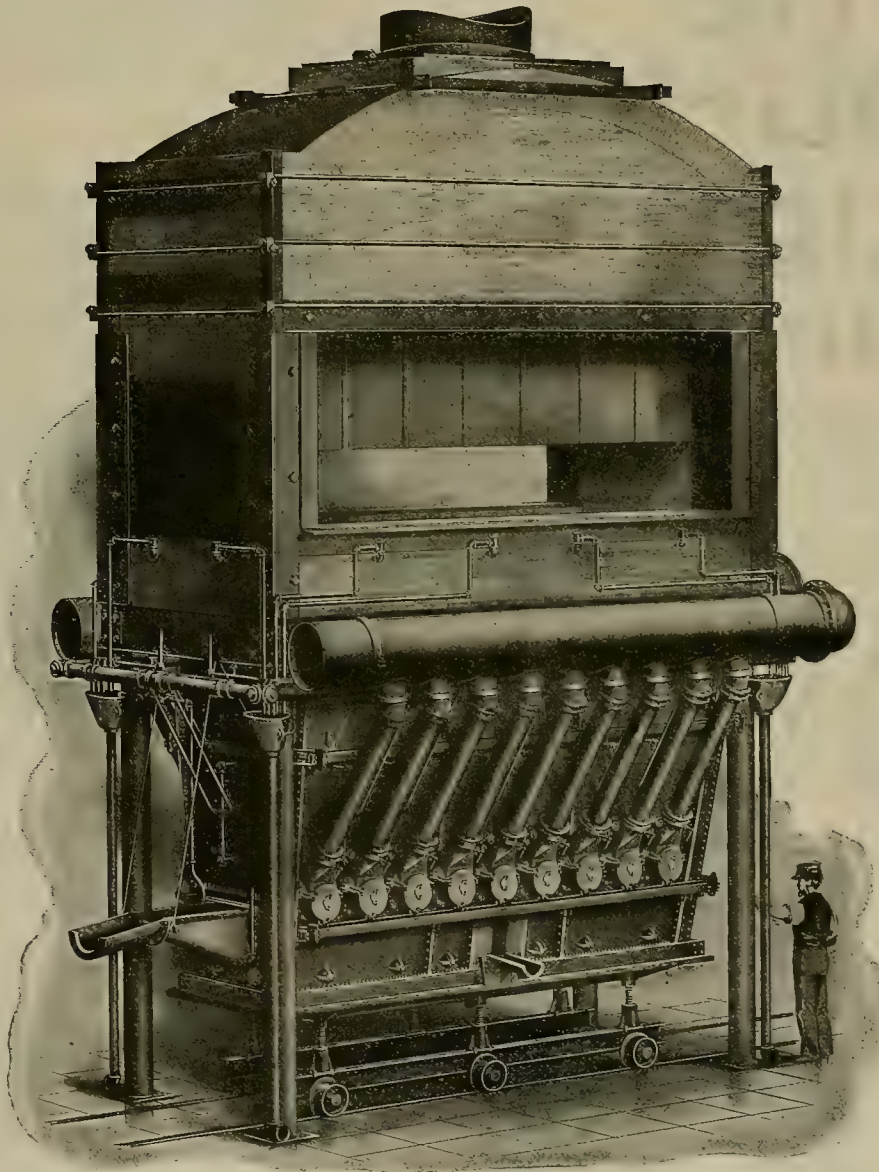
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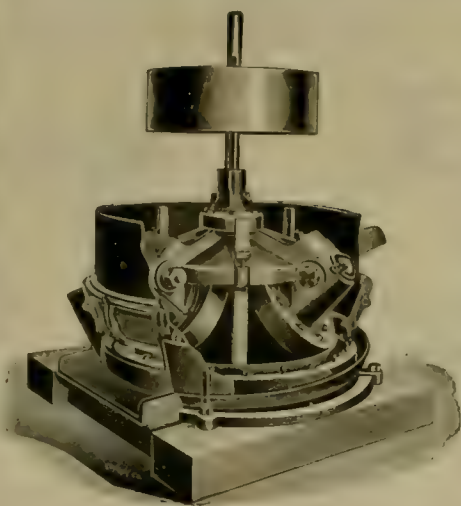
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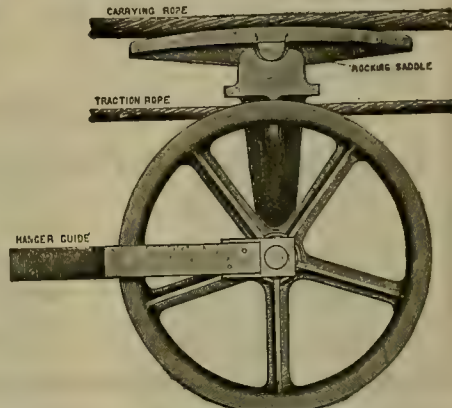
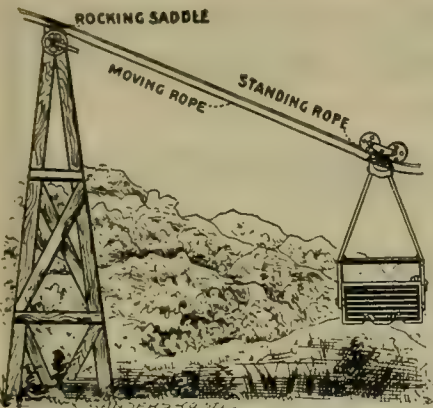
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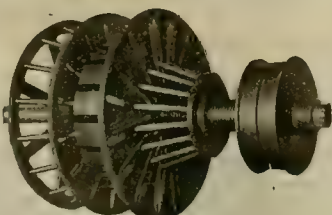
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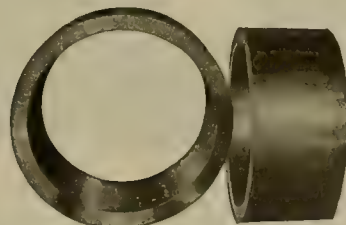


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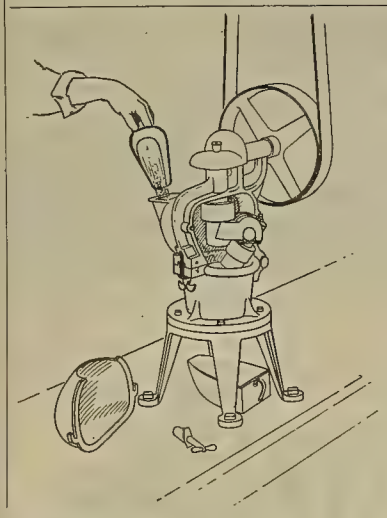
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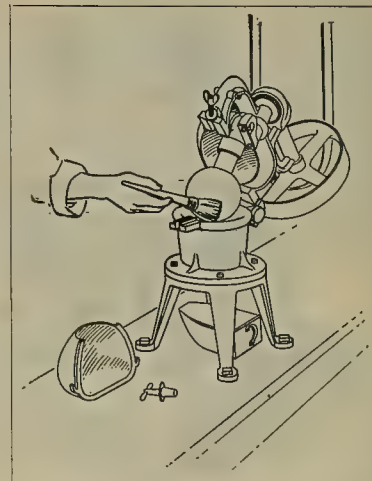
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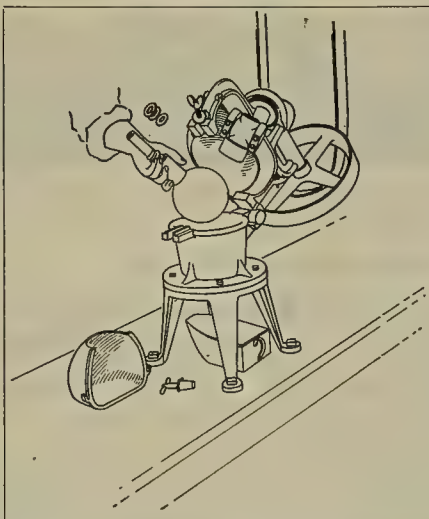
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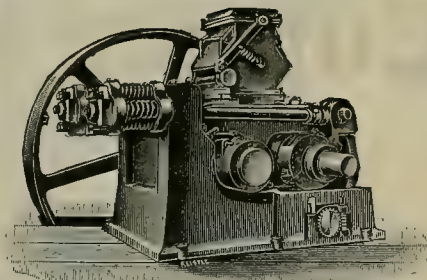
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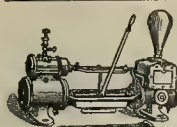
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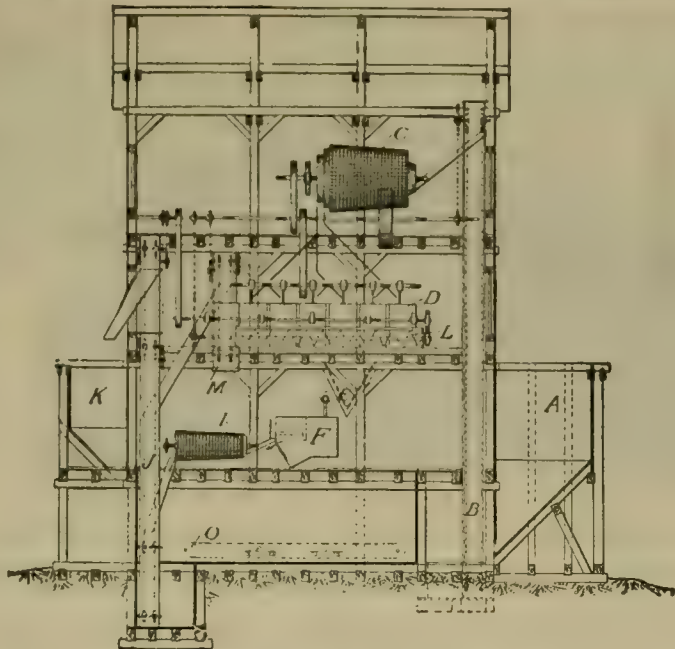
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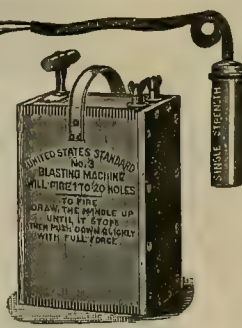
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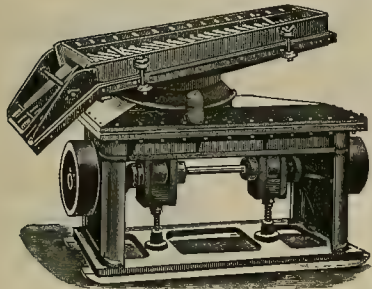


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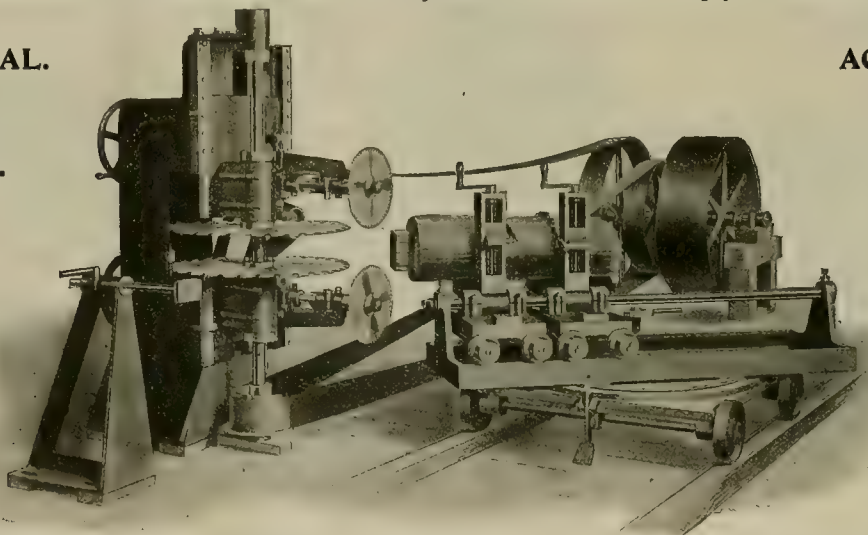
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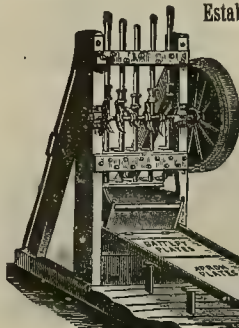
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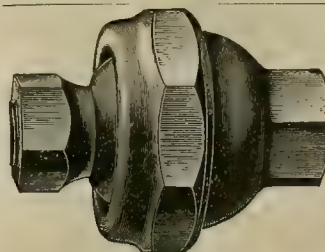
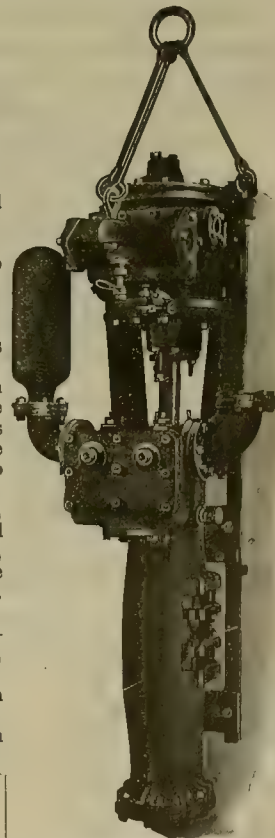
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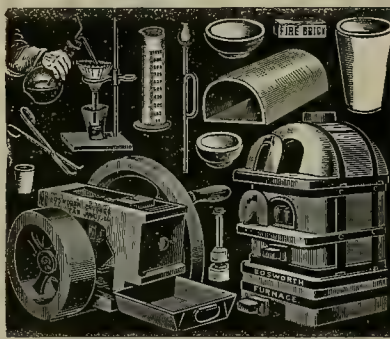
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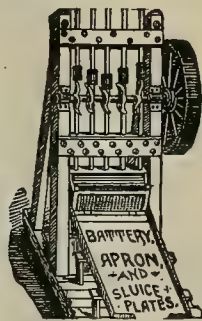
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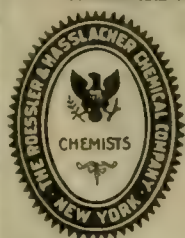


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**YUBA CONSOLIDATED GOLD MINING COM-  
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Francisco, California; location of works, Nevada  
County, California.

Notice is hereby given, that at a meeting of the  
Board of Directors, held on the 19th day of Aug-  
ust, 1901, an assessment (No. 3) of three cents per  
share was levied upon the capital stock of the cor-  
poration, payable immediately in United States gold  
coin, to the secretary, at the office of the company,  
Room 801 Claus Spreckels Building, San Francisco,  
California.

Any stock upon which this assessment shall re-  
main unpaid on the 24th day of September, 1901, will  
be delinquent, and advertised for sale at public auc-  
tion; and unless payment is made before, will be  
sold on MONDAY, the 14th day of October, 1901, to  
pay the delinquent assessment, together with the  
costs of advertising and expenses of sale.

By order of the Board of Directors.

EDWARD H. STEARNS, Secretary.

Office—Room 801 Claus Spreckels Building, San  
Francisco, California.

**THE CALIFORNIA DREDGING COMPANY.**—Prin-  
cipal place of business, 120 Sutter Street, San  
Francisco, California.

Notice is hereby given, that at a meeting of the  
Board of Directors, held on the 6th day of August,  
1901, an assessment of 10 cents per share was levied upon  
the capital stock of the corporation, payable im-  
mediately in gold coin, to the secretary of the cor-  
poration, at the office of the company, Room 56, 120  
Sutter Street, San Francisco, California.

Any stock upon which this assessment shall re-  
main unpaid on the 24th day of September, 1901, will  
be delinquent, and advertised for sale at public auc-  
tion; and unless payment is made before, will be  
sold on TUESDAY, the 1st day of October, 1901, to  
pay the delinquent assessment, together with the  
costs of advertising and expenses of sale.

(Signed) SAM. W. CHEYNEV, Secretary.

120 Sutter Street, San Francisco, California.

**ETNA PETROLEUM COMPANY.**—Prin-  
cipal place of business, San Francisco, California. Loca-  
tion of works, Fresno County, California.

Notice is hereby given, that at a meeting of the  
Board of Directors, held on the 22nd day of August,  
1901, an assessment of ten (10) dollars per share  
was levied upon the capital stock of the corpora-  
tion, payable immediately to the secretary, at the  
office of the company, No. 316 California street,  
San Francisco, California.

Any stock upon which this assessment shall re-  
main unpaid on the 24th day of September, 1901,  
will be delinquent, and advertised for sale at public  
auction; and unless payment is made before, will be  
sold on the 14th day of October, 1901, to pay the  
delinquent assessment, together with costs of ad-  
vertising and expenses of sale.

R. F. MACLEOD, Secretary.

Office—No. 316 California street, San Francisco,  
California.

**WILLIETTA MINING & MILLING COMPANY.**—Prin-  
cipal place of business, San Francisco, California; loca-  
tion of works, Tuolumne  
County, California.

Notice is hereby given, that at a meeting of the  
Board of Directors, held on the 19th day of August,  
1901, an assessment (No. 2) of one (1) cent per  
share was levied upon the capital stock of the cor-  
poration, payable immediately in United States  
gold coin, to the secretary, at the office of the com-  
pany, Room 8, 206 Sansome street, San Francisco,  
California.

Any stock upon which this assessment shall re-  
main unpaid on the 30th day of September, 1901,  
will be delinquent, and advertised for sale at public  
auction; and unless payment is made before, will  
be sold on MONDAY, the 21st day of October,  
1901, to pay the delinquent assessment, together  
with the costs of advertising and expenses of sale.  
By order of the Board of Directors.

FRANK E. CORDES, Secretary.

Office—Room 8, 206 Sansome street, San Francisco,  
California.

**OSCEOLA CONSOLIDATED MINING COMPANY.**  
—Location of principal place of business, San Fran-  
cisco, California; location of works, Plymouth,  
Amador County, California.

Notice is hereby given, that at a meeting of the  
Board of Directors, held on the 28th day of August,  
1901, an assessment (No. 12) of one (1) cent per  
share was levied upon the capital stock of the cor-  
poration, payable immediately in United States gold  
coin, to the secretary, at the office of the company,  
307 Montgomery street, San Francisco, California.

Any stock upon which this assessment shall re-  
main unpaid on the 5th day of October, 1901, will  
be delinquent, and advertised for sale at public  
auction; and unless payment is made before, will  
be sold on MONDAY, the 28th day of October,  
1901, to pay the delinquent assessment, together  
with the costs of advertising and expenses of sale  
By order of the Board of Directors.

HOLLAND SMITH, Secretary.

Office—307 Montgomery street, San Francisco,  
California.

## DELINQUENT SALE NOTICE

**CONSOLIDATED ST. GOTHARD GOLD MINING  
Company.**—Location of principal place of business,  
San Francisco, California; location of works,  
Nevada County, California.

Notice.—There are delinquent upon the following  
described stock on account of assessment (No. 19)  
levied on the 9th day of July, 1901, the several  
amounts set opposite the names of the respective  
shareholders, as follows:

| Names.                    | No.<br>Cert. | No.<br>Shares. | Amt.     |
|---------------------------|--------------|----------------|----------|
| Bryar, Nathan.....        | 298          | 1414           | \$141 40 |
| Bryar, Nathan.....        | 299          | 3404           | 340 40   |
| English, John.....        | 377          | 250            | 25 00    |
| Hornung, F.....           | 305          | 71             | 7 10     |
| Hornung, C. F.....        | 532          | 1330           | 133 00   |
| Plagemann, Jac. Fred..... | 608          | 600            | 60 00    |
| Sellers, Mrs. J. C.....   | 382          | 100            | 10 00    |
| Sellers, Mrs. J. C.....   | 303          | 100            | 10 00    |
| Schrader, T. C.....       | 294          | 3 0            | 31 00    |

And in accordance with law, and an order from  
the Board of Directors, made on the 9th day of  
July, 1901, so many shares of each par value  
stock as may be necessary will be sold at  
public auction at the office of the company, Rooms  
113-114 Crocker Building, San Francisco, California,  
on MONDAY, the 2d day of September, 1901, at the  
hour of 2 o'clock P. M. of said day to pay delin-  
quent assessments thereon, together with cost of  
advertising and expenses of the sale.

B. N. SHOCRAFT, Secretary.

Office—Rooms 113-114 Crocker Building, San Fran-  
cisco, California.

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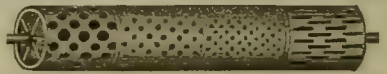
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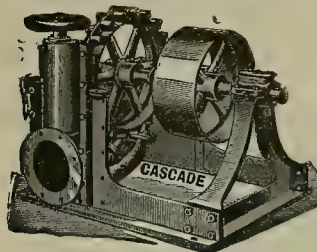
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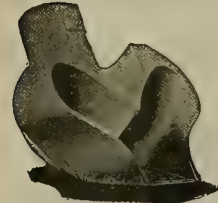


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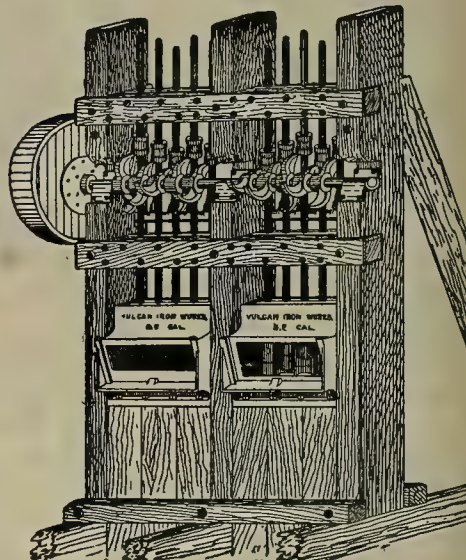
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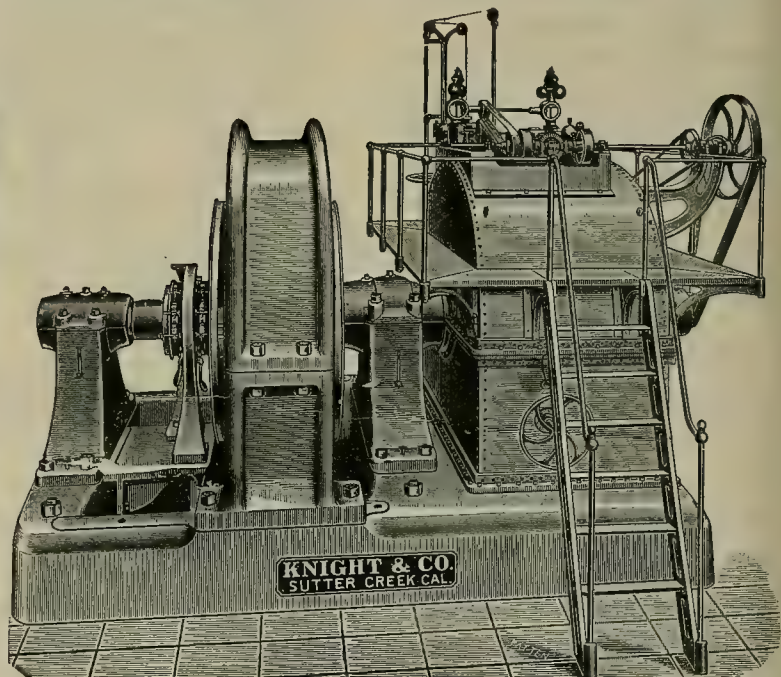
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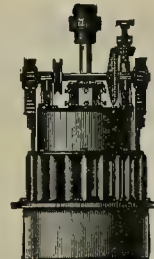


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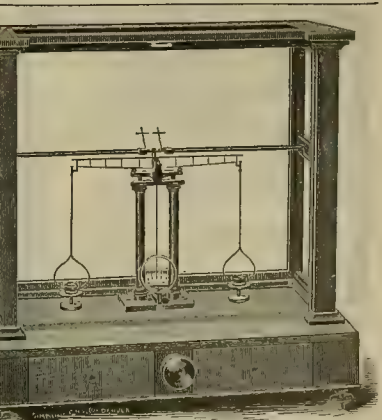
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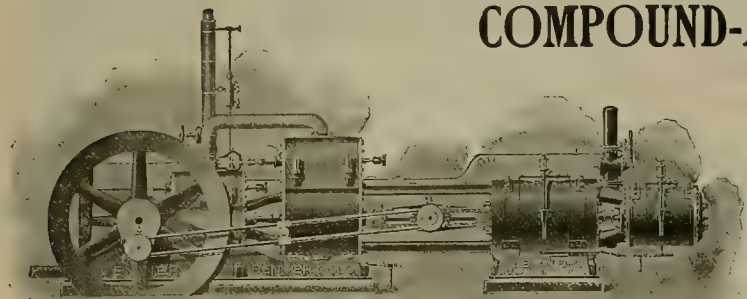
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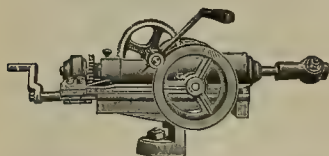
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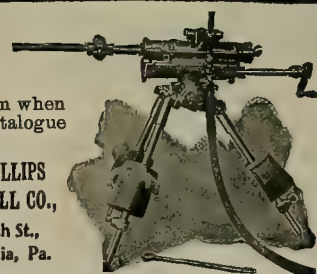
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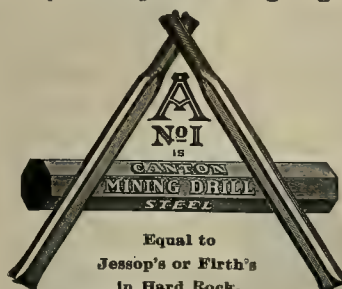
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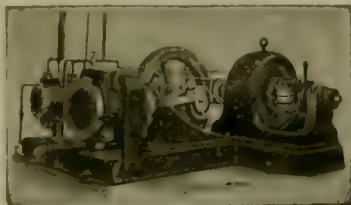
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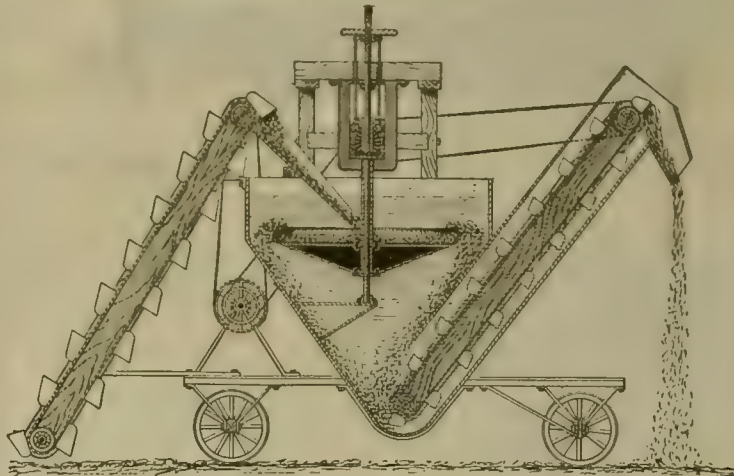
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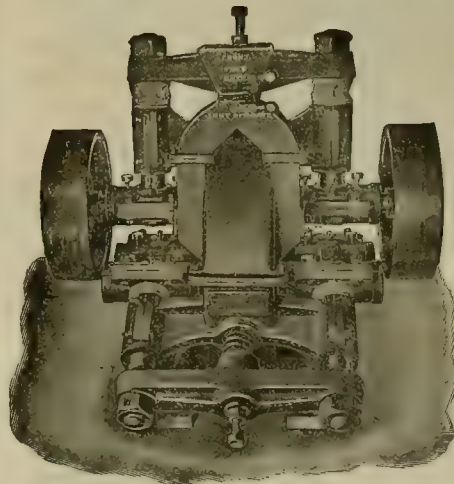
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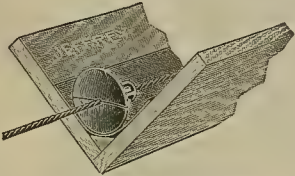
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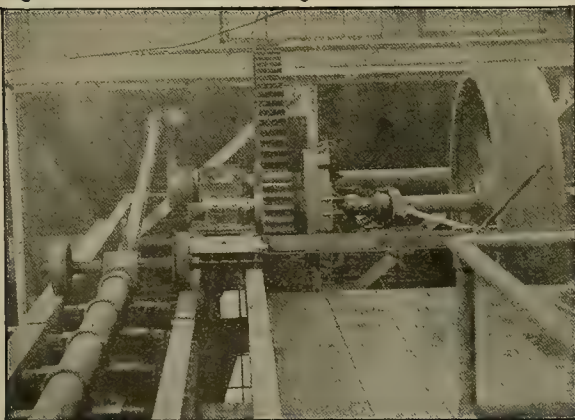
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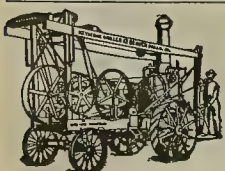
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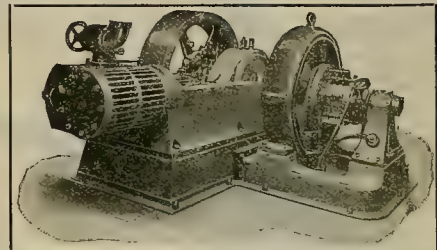
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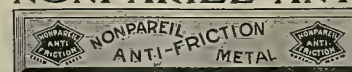
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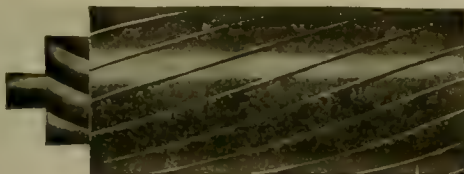


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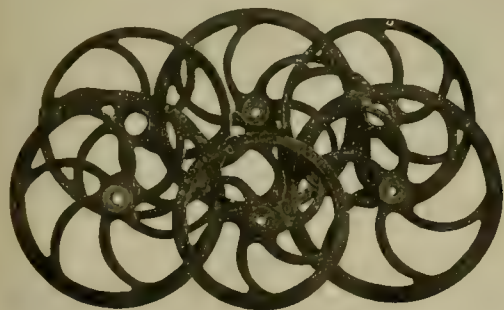
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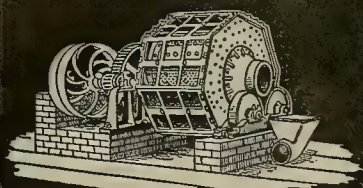
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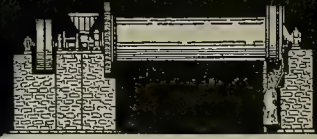
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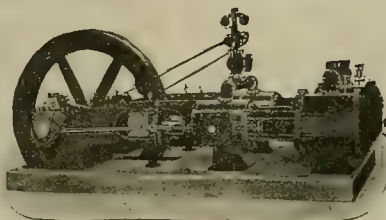
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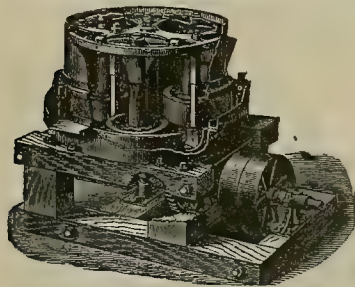
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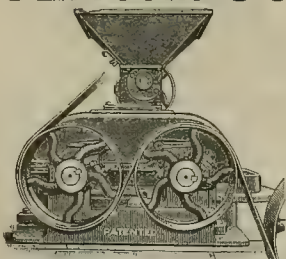
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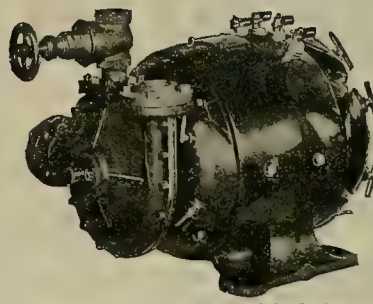
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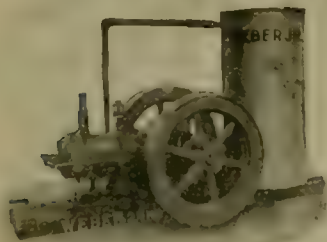
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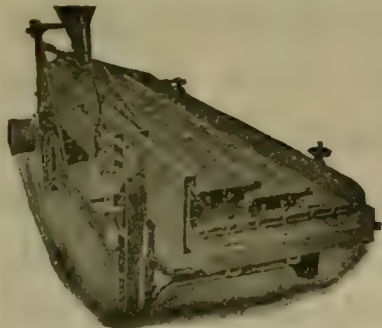
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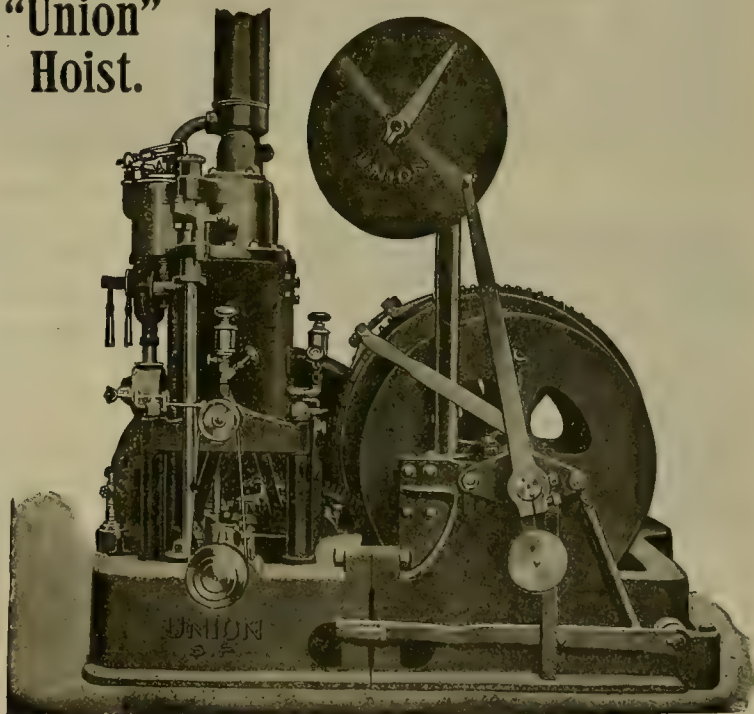


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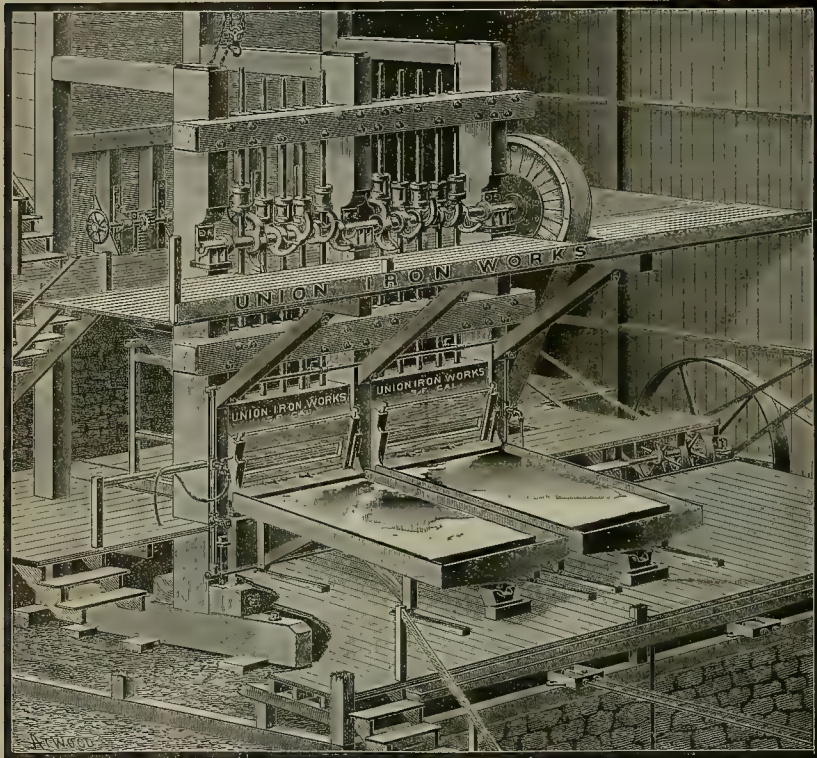


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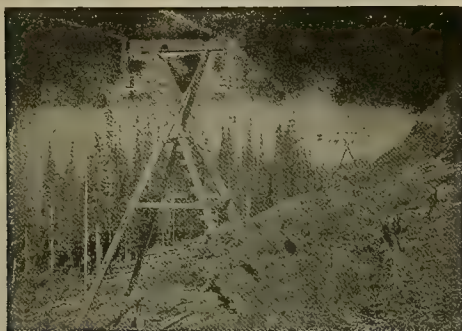
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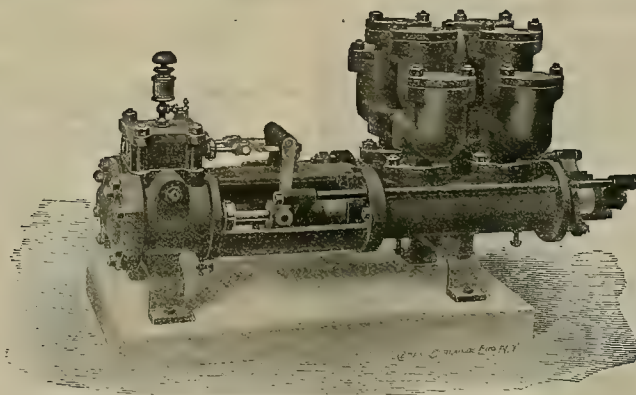
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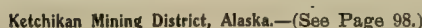
Whole No. 2146.—VOLUME LXXXIII.  
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Commenting on the opinion of Prof. George F. Becker of the U. S. Geologic Survey that the Transvaal could produce gold at the rate of \$100,000,000 a year for the next thirty years, Mr. C. W. Purrington, who has traveled in Siberia and examined some mining propositions there, says in the Engineering Magazine for September that, in his opinion, providing American machinery and gold mining methods

Siberia is a land of magnificent distances. Magnificent distances separate the placer deposits from

Siberia has excellent possibilities for the use of American mining and milling machinery. It has more



There is a very large area in Siberia that contains minable gold deposits—a far larger area undoubtedly than has even been explored yet. It is a much dif-

The fact is Siberia is not much unlike the Yukon and Nome regions of Alaska in its mines. It is no better because a great deal bigger. Absurd, extravagant estimates of possible gold yield from Siberia, based on a leadpencil, should not be permitted to add to the already heavy overburden of popular misinformation concerning a comparatively new country, desirable for what it is.



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San Francisco, September 7, 1901.

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MISCELLANEOUS.—Concentrates, 97. Ketchikan Mining District, 98-99-100. Buffalo Exposition Exhibit of "The Lunkenheimer Co.," 100. Mining and Metallurgical Patents, 101. Personal; Recently Declared Mining Dividends; Commercial Paragraphs; Catalogues Received; New Patents; Notices of Recent Patents, 104.

In pursuance of its policy through the years this paper presents in this issue a carefully written and accurate statement of facts regarding the mineral wealth and present status of development of a portion of the great territory of Alaska now attracting deserved attention. The article on page 98 was written especially for this journal, the data secured involving the skilled services of an expert mining engineer, who at considerable expense made personal examination of that region in the interests of this journal. There are few parts of this west half of America that have not been visited by some competent representative of the MINING AND SCIENTIFIC PRESS, and the development and attendant prosperity of many a mining region has been confessedly aided and stimulated by the early publicity thus given to accurate technical data and commercial information concerning it.

NEW mining districts are apt to get more or less adverse criticism through the disposition of prospectors to demand cash payments down, with bonds, on their undeveloped claims. In this, as a rule, they only reflect market conditions. In a new district, almost any sort of a prospect has some exchange value. There are always more than the usual number of buyers looking for the big mine that the prospector locates, without knowing what he has really found. Prospecting in new districts involves cash outlays by prospectors that they feel the separation from, when it is a question of bonding their claims on time without cash payment. More than the others, the fact that buyers are seeking the mines, not the mines the buyers, tends to create the prospectors' disposition. In old mining districts, prospects are differently regarded. The sure, easy-made mines are assumed to have been picked out and made. What remains is assumed to carry more hazard as to its being a mine at all. What prospecting investment has been made is not felt by the prospector to the same extent as in a new district. His own personal position is different. He has interests in the district that are independent of the prospect he is offering to sell, where in the new district he has yet to make such ties. He has to go to the mine buyer, the latter does not come to him. All things considered, the disposition of prospectors in new districts to expect a cash payment on account on giving a bond on prospect claims has a reasonable basis, and investors who seek such claims should consider such propositions as legitimate business and entitled to reasonable consideration. The amount of cash down that is asked is usually not a large sum, and if the prospect showing does not justify it, better leave the prospect alone even if it can be had without a cash payment. The question is finally, however, a matter of contract, adjusting itself in the end to the mutual satisfaction of interested parties.

## A Theorem or an Observation.

A strike of the workmen employed in the Le Roi mine of Rossland, B. C., has closed down the mine. The ostensible reason for the strike is stated by the workmen to be the refusal of the mine management to pay the common underground laborers, who pushed cars and shoveled rock into them, \$3 a day in place of \$2.50. The real reason was the intention by the mine workmen in the Le Roi mine, and in other mines and in other places, to establish the principle that they ran the mine, and not the men in London, who supposed they did when they bought and paid for it by their own labor.

To the mine workmen the "principle" is a sort of fetish that they consider should be bowed to and sacredly regarded, even though it has not been demonstrated to have a money-convertible value. The men in London undoubtedly consider the "principle" wrong, and anyway it is not their fetish, because—if for no other reason—it is not a value convertible into money. The men in London who think they own the mine want "results" from owning it which are convertible into money.

In this business difference between the two parties, a dispassionate, disinterested analysis of the real difference shows, that of two things separating them, neither party really wants the thing the other party wants. What reason is there, then, why each party should not have the thing he wants undisputed by the other, and so end a business difference which, if this point of view is logical, does not exist? Why should not the Le Roi mine workmen have the "principle" and run the mine, and, at the same time, the men in London have the "results" and get the money?

The books of costs kept by the mine management show for a considerable period of time the segregated costs per ton of ore loaded on the cars at the mine, for labor, service, material, supplies, dead work, maintenance of machinery of the mine, sorting of ore and loading the ore. The minimum average grade of the ore desired for shipment is known. The number of men in each department of labor is known. The capacity of the operating machinery is known. The additional sum that the difference of 50 cents a day added to muckers' wages would make is known.

Suppose the management add this last sum to the total of the other known costs. If it should become necessary, the management can raise the minimum average grade of the ore desired for shipment to compensate this addition of cost. Then suppose the management offer to make a direct contract with an association of about the same number of mine workmen, in proper proportion for the several departments, to mine the ore and put it on the cars—in brief, to run the mine as a mine.

The conditions established by the management might be that a bid could not be considered in a sum per ton in excess of the total of the costs, as shown by their books of past operations, plus the cost for the added 50 cents a day to muckers. Nor would a bid be considered lower than the total of costs as shown by their books for past operation. The mine management can be presumed satisfied with a minimum bid that makes the cost the same sum it has been paying. The mine workers in their demand for the increased wages claimed that they would give an equivalent in increased efficiency. They can be presumed satisfied to make a maximum bid not more than the additional wages for the muckers would require. All supplies and material would be supplied by the management to the contracting mine workers at the same unit costs as paid in past operations. The ore delivered for shipment from the mine would have to be of the average grade demanded by the management and no less in ton value.

The mine workers on their part could fix the rate of wages they would pay themselves, choose their own foremen and work their own hours. They would receive in money the value of all that they saved in supplies and material, and would have all the gain that came from increased output per man. All earning on the contract, however, over and above the wages they pay themselves, and costs of supplies and material, should be divided equally, share and share alike, in proportion to the time worked by each man. The difference in kind of

work or rate of wages should not enter into this division. Each workman has in theory contributed equally, and should therefore share equally. The mine workers' association should be debarred absolutely from hiring labor for wages. All employed must be sharers.

The contract here outlined is a large one. It can not, however, be divided without losing the very thing that is its essence, namely, the undivided responsibility of the mine workmen in running the mine. Preferably it should be bid for and given to the late mine workers of the Le Roi mine; but, if they do not bid equally low with the lowest offer, the bid of other associations of mine workmen should be accepted. As the miners' unions are organized by separate trades or employments, no one of them could make the contract; but the workmen could merge the unions so that they could bid as though a single organization.

The mine management is reported to be considering a bid from a contractor to take out ore, and it has been commented thereon that the acceptance of such a bid would clear up the difficulty that caused the strike. The fact is that it would do just the opposite. It cannot be presumed that the mine management would contract at a higher figure than that of their own operations as shown by their costs accounting. If at the same figure or less, the contractor's profit, which is the inducement for him to make the contract, reduces by its amount what the mine workmen have been receiving heretofore.

The mine workmen may or may not be equal to the opportunity of a contract by which they get all the benefit of their trade skill and a union organization. Under such a contract they work for themselves. They fix their own hours, their own wages, select their own supervision and select their own personnel. If they are not equal to the opportunity, it is because the intelligence required to work constructively for themselves is of a different and superior order from that required to work destructively against others.

In the suggestion that the mine management contract with the mine workers direct for the production of their labor, a division of profit of the mine is not implied. The mine worker is given, first, what the mine owner is willing to give, and the mine worker to accept, and given, second, what he gains from the opportunity of adding the efficiency of his brain to his labor, without depriving the mine owner of anything he has or can get.

The preceding discussion is not intended as the solution of the economic question of the strike at the Le Roi mine. At the most, it is merely a statement of the theorem of the facts to which at the end is not even written Q. E. D. At the least, it is the writer's manner of stating his absolute agreement with what each party to the question says of itself and thinks of the other party.

THE Texas Legislature has under consideration a proposition to tax the oil wells 2% on their gross output. The 2% does not seem unreasonable, though it may not be equitable when taxation on other property is considered. It is perfectly clear that the only thing about the oil land and the oil well that has real value is the oil after it has reached the surface and become a commodity. The taxation of a hole in the ground does not seem to have a basis in reason. There is a recognition of the real valuable thing by men in the character of their dealings with each other over oil lands. Rental is made a payment in kind out of the production, if any. The State is proposing in a 2% tax on production, a rental in kind. If it ends with that tax, it should be satisfactory to petroleum well owners, provided that the 2% rate does not place on their property an unequal burden of taxation. Whatever question there may be is in the equality of the 2% flat tax. It would seem that 1% would come much closer to giving the industry only an equal burden as assessment undervaluation of other kinds of property are notorious. A tax rate of 2% on an assessment valuation that is only 25% of the market value of property is only equivalent to  $\frac{1}{5}$  on the market value. The rate of 2% on petroleum is from its nature on the market value. However, Texas petroleum producers are to be congratulated on being taxed as rationally and reasonably as is proposed. They are fortunate in not having California taxation laws and assessors.



## Concentrates.

A MEXICAN LAW requires that 80% of the labor employed at mines shall be native Mexican.

A COPPER WIRE, 00 B. & S. gauge, will weigh 2129 pounds to the mile.

THE Russian unit of weight is the pood, 36.114 pounds avoirdupois. Coal and gold are alike measured by it.

THE average fineness of California placer gold is 885 gold and 115 silver. Of Siberian gold is 930 gold and 70 silver.

BOTH draw temper and plunge temper for drill steel have their advocates among mine blacksmiths. Practically machine drills have to be given a plunge temper.

THE commercial price of graphite in New York is dependent on the quality from \$8 a ton to \$80. The best grade of American graphite pulverized is worth \$30 a ton.

CONTRARY to commonly received opinion, it is stated that experiments made to determine loss of coal through exposure to weather show that the loss of calorific power was slight.

THE expansion of the production of gold has been accompanied by an equivalent expansion of the uses of gold in the arts. The quantity of coined money has not increased in the ratio of the gain of production.

THE capacity for work of the Russian peasant who is the mine laborer of the country is reduced by the frequent legal holidays which he is sure to observe as part of his religion. Some of them require three days celebration.

THE economic unit in mills for free milling gold ore has steadily gained in the number of stamps that can be handled by two men on a shift. Where at first ten stamps was the economic unit, forty stamps is now the number.

BEFORE starting to drill a hole in rock, the place decided on should be thoroughly cleaned of loosened rock by the pick and hammer. Everything that the drill might start as it was driven should be taken out before starting the drill.

ONE of the big Beaumont, Texas, spouting oil wells got away after it had been capped and caused the death of three men who tried to get control of it. A workman in a diving suit finally reduced it to control without danger to himself.

THE quantity of coal consumed per horse-power hour by marine engines is now 1.5 pounds, as compared with 1.75 pounds ten years ago. Where it required ten pounds of coal to carry one ton of cargo 100 miles ten years ago, it is now done with four pounds.

A REGULATION of the water jet on the buckets of a Pelton wheel has been effected by dividing the buckets and causing the two halves to approach or separate, permitting a part of the jet to pass between the sections. This does away with the deflecting nozzle.

DURING the year ending June 30, 1900, the U. S. Government patents on account of railroad grants covered 2,470,804 acres. There still remain in the public domain 914,096,074 acres of land which have not been appropriated. Much of that area has not been surveyed.

THE probable value of the energy transmitted to the earth from the sun is stated to be about 133-foot pounds per second per square foot of receiving area, or 0.24 H. P. Recent experiments at Pasadena, Cal., gave a result of about 1 H. P. for 100 square feet of reflecting surface.

THE Dominion of Canada is making a geological survey of the Boundary district in British Columbia. The area to be covered extends on the international boundary line from Kettle river to Okanogan lake, and about 100 miles north from it. Topographic and mineral maps will be published.

WHILE the economists and traffic experts are deciding that electricity cannot be substituted for steam for transportation by rail outside of a short distance limit the business men and working engineers are raising the limit till it appears doubtful if there is a limit at all to the commercial substitution.

THE presence of charcoal in old tailings which are being cyanided will account for some loss of gold, the charcoal being a precipitant of gold. Roots and other vegetable matter will soak up solution and take whatever gold there is in the solution into the final tailings, but loss from this is comparatively insignificant.

FOR hand drilling, the blacksmith should prepare the drills in sets. A drill hole gets smaller in diameter as it gets farther in, owing to the wear of the rock taking down the flared corners of each drill first, and thus reducing the length of the cutting edge which does the last work of cutting before the drill is discarded for a sharp one.

SAN FRANCISCO shipping has heretofore had little or no installation of loading and unloading machinery as a substitute for manual labor. One result of the strike of the stevedores has been the introduction of electric grain loading machinery at Port Costa, by which one man tending the machine does the work that required five men formerly.

ADVANCING a drift heading 7 feet high by 6 wide, in tightly cemented gravel, drilling by hand, will use about three pounds of 40% dynamite to the foot. Compari-

sons made by different methods of drilling and shooting have shown that in this character of ground there is not likely to be any gain of lowered cost made by shooting the full round of holes at one time over shooting out a center cut first.

IN the manufacture of commercial asbestos the serpentine rock containing it, as it comes from the mine, is first hand-sorted, using hammers on larger pieces, then crushed and picked over again on a belt, the waste being thrown out. It is further passed over a series of screens, which take out rock dust and short broken asbestos fiber before the clear commercial grade of fiber gets to the packers.

BY a bushel of coal or charcoal is always understood the heaped bushel, which is equal to 2688 cubic inches. The bushel of the table of dry measure in common use is what is known as the struck bushel, equal to 2150.42 cubic inches. In measuring coal by the bushel unit it is always broken coal that is referred to. Coal in place is not measured by that unit, but by the long ton of 2240 pounds. A bushel of bituminous coal weighs from 70 to 78 pounds, of charcoal weighs from 23 to 46 pounds.

THE Arizona underground river found in a limestone cave may come from subterranean springs, but is more likely to be the diversion of a surface stream into the cave through some higher opening. It is even more unlikely to continue flowing underground, particularly if a large stream. Diverting out of the cave may disclose where it was going in its natural course, particularly if the act of diversion is accompanied by a corresponding loss of water to some one using it below without knowing its source.

A CEMENT which is proof against the influence of acids can be prepared by melting together one part of India rubber with two parts of linseed oil. This should be gradually incorporated with three parts of bole (a fine-grained ochreous clay), so as to form a plastic mass. This when heated softens but very little. Though it does not easily dry upon the surface, when once set it is not affected at all by nitric acid. Its drying and hardening is materially promoted by mixing with one-fifth of its weight of litharge or minium.

TO LIGHT a number of fuses for a round of holes loaded for blasting, it is customary among the Western miners to "spit" the fuse, as they term it. The end of the fuse is spread a little and a small pea-size piece of dynamite is pressed down into it. This fires readily and starts the powder of the fuse, which sometimes without the spitting refuses to fire as quickly as the miner would like. In Colorado mines a make of fuse is used so that the miner can bunch the clear ends and light all together with one fire without spitting.

EVERY operation involves some waste which may or may not be loss, according as it is commercially avoidable or unavoidable. Comparative efficiency is a comparison of final commercial results rather than a direct measurement of the magnitude of the waste in one case against the waste in another. Particularly is this true of the operation of mines and the reduction of ores. The point where a waste becomes a loss can best be determined by some actual physical trials, coupled with close book-keeping records and analysis of them.

THE cost of obtaining a patent to a mining claim is subject to considerable variation. Outside of the land, for which \$5 an acre is paid for lode claims and \$2.50 an acre for placer claims, the costs are: Deposit with the Surveyor-General for an official work on survey plats and stationery, \$40; deputy surveyor from \$40 to \$200, dependent on the time required to do the surveying in the field; notary fees for survey and application for patent, \$10; \$30 to \$60 for newspaper publication of application; attorney's fee not less than \$50; Register and Receiver Land Office fees, \$15. The total, without the land, will be from \$200 to \$400.

WHERE slip joint riveted sheet metal pipe is used under pressure for water distributing service, it is desirable, even if the pipe is fully buried, to set the crosses, T's, elbows and gates, in masses of concrete sufficiently heavy to hold the pipe in place against shock. Slip joints are not perfectly tight, and what is called water hammer, the cumulative effect of turning off discharge valves suddenly, tends continually to loosen the slip and make leaks, the water softening the ground in the trench the tendency of the pipe to yield continually increases. The effect of the solid concrete masses at the crosses, T's, elbows and gates is to take up the water ram shock and prevent it from starting the leaks.

A SIPHON is frequently a convenient and inexpensive pumping rig for a mine where the water does not require to be lifted more than the air pressure water column height of the altitude of the work. Water can be lifted from a winze in a drift floor by carrying the discharge end of the pipe siphon down the drift till it is lower than the inlet. Where possible, to avoid the frequent filling of the pipe and restarting required as a result of the accumulation of air at the high point, a water inlet pipe from a pressure source is connected at the high point and a jet discharge is introduced into the siphon pipe and directed toward the discharge end. With this the pipe can be kept full and the flow is assisted by the acceleration and suction of the jet stream which can be regulated as to quantity and force at the pleasure of the operator.

A MINE which shows high commercial values and large quantities of ore should not be condemned and abandoned on the unsupported evidence of a failure to find similar ore values in a tunnel heading several hun-

dred feet underneath the surface showing. Ore shoots do not have to go down vertically, and with no work in the surface determining dip, the pointing of a tunnel to pick one up at several hundred feet of depth is pure speculation, and not mining. The tunnel may pass one side of the shoot or it may enter the vein in a horizontal barren zone. Where the mistake has been made of driving the tunnel, and taking needless chances before more than scratching the surface of the rich outcrop has been done, the proper thing to do if the tunnel fails to find ore, is to go to the outcrop, sink on it in the ore, and mine the latter out exactly if there was no tunnel at all. The extending of developments from the outcrop may ultimately indicate how to make the tunnel useful.

TO FACILITATE the cleaning of pressure boxes at the head of power pipe lines of the accumulation of floating trash, they should preferably be set on an inclination of about 60° from the bottom of the box, with the direction of the slope toward the inflow of water into the box. Such screens should be made of large area, with small mesh holes, the aggregate area of opening of the holes being such that a very low rate of flow, say, 2 feet to the second, will keep the pipe full to the water level of the pressure box. Trash will then collect against the screen, but is not liable to become enmeshed in it. Closing the inlet gate to the pressure box and opening the cleaning gate, the water in the head of the pipe beyond the screen, flowing back through the screen, sweeps the accumulations that were plastered against it into the waste. Its tendency is to fall away from the screen, and not into it.

IN mines a large amount of steel is consumed by the loss of drills, mols and bars. The principal cause of these losses comes from the hiding of the tools, particularly drills, by miners to insure to them a supply when needed later. Once hidden, it is frequently forgotten and becomes lost. The surest way to break up the habit is for the mine owner to see that the mine is amply supplied at the start, and that the blacksmith and tenders keep plenty of sharpened steel at the stations at all times. When the miner finds that he can get plenty of steel without having to store it in advance he will cease to hide it. The hiding of the steel for the purpose of insuring a working supply of tools is not to be considered a fault of the miner. It is unconscious evidence of his wish to give his full equivalent of work for his wages. The fault rests with the mine management that creates the condition.

A FOUNDATION for machinery can be built economically where the surface soil is so deep that going to bed-rock is impracticable, and where concrete cannot be used on account of the high cost of the materials, by building a heavy log cribbing in the surface soil. An excavation of ample area and depth should be made. The character of the soil and weight and power of the machinery determine this. In light soils, with an 80 H. P. engine to be held in place, a cribbing 16x24 and going 20 feet below the surface is not extravagant. The cribbing should be pin or bolt-fastened, and the soil is thrown back and tamped in tight with water as it is built upward. The foundation bolts should go to mudsills deep down into the cribbing timbers. The effect is to make of the crib the equivalent of a concrete block. Such a foundation, made as described, will be found free from unequal settlement and vibration.

SIBERIAN placer mining tailings are a poor investment for foreign capital. There is not the amount of gold in them that there is represented to be by the Russians. There is not the quantity of them at any one point that justifies the power and plant installation necessary to rework them. The system of mining carried on everywhere under the direct supervisions of Russian government mining engineers results in placers being worked in pits of varying size. From the washing machine, whatever it may be, the tailings are carted away and dumped where designated by the engineer. One small pit will provide several such piles, no one of them containing many thousand cubic yards of gravel. Sampling these piles values may be had from 10 to 30 cents a cubic yard, and with some of the oldest rich workings where quicksilver was used without understanding there may be values as high as \$1 to the yard. These values and the quantities of tailings are insufficient to justify the investment of capital. In Siberia they do not attract even the Chinese, who are close miners there as here.

THE adulteration of placer gold dust, or the imitation of it, that has deceived gold dust buyers in Nome and Dawson is effected, according to descriptions given, by coating the base metal grains with gold. The streak test ordinarily should detect this, for the coating would almost certainly have to be purer gold than the genuine dust of the district. If the imitation is mixed with the real and the dust fine, a very sure test, and one made at the expense of little time and cost, can be made as follows: Test the streak of some grains for the color and preserve it for a comparison. Take from ten to twenty grains of the dust without selecting, mix it with borax to make a slag, fuse under the blowpipe on charcoal, using gas or a spirit lamp. It will melt to a button, which can then be tested for streak and comparison be made with the streak preserved. There should be practically no difference in color. If there is a marked difference, it is safe to conclude the gold dust contains more or less base metal that should not be there. A gold dust buyer should be prepared to melt the entire lot of any questionable gold dust offered him, and determine its value from the streak of the melted bar.



## Ketchikan Mining District, Alaska.\*

Written for the MINING AND SCIENTIFIC PRESS.

Ketchikan mining district, as it is commonly referred to and described, is inclusive of all of the area of Alaska south of Wrangel to the international boundary—an area, roughly, 130 miles north and south by 150 miles east and west. Of land and water it takes in about 20,000 square miles. Besides the mainland from Portland canal, nearly to the Stickeen river, it includes a great number of islands, principal among which at the present time, by reason of mineral discoveries, are Prince of Wales, Revillagigido, Annette, Gravina, Dall and Kosciusko. Other large islands, of which little or nothing is yet known as to mineral resources, are Wrangel, Zarembo, Etolin and Duke. A reference to the map on the front page will give an intelligible idea of the geographical relations between the islands and the mainland.

The topography of both the islands and the mainland is mountainous. There is little or no plain land at all, and little of the area is what might be described as hilly. The effect of the whole is of a plateau surface eroded into canyons and sharp summits and then submerged until the lower canyon cuts are submerged beneath the sea waters. The latter form straits, sounds, bays, inlets and fiords or canals as it is the local custom to name them. They so cut the land up into narrow bodies that no point is distant 5 miles from the sea. These waters are so comparatively sheltered that boat landing is practicable almost anywhere on the shore lines in summer and there are many safe sheltered harbors for any weather. The exploitation of the district is thus exceedingly facilitated by accessibility to the cheapest of all transportation roads—the open sea.

The mining history of the district is very recent. Probably the first notice of mineral of value in it was a discovery of copper-bearing deposits of great extent made between 1870 and 1874 by prospectors who were exploring for W. C. Ralston of San Francisco, Cal. His death in the latter year put an end to further investigation at that time, and the slight knowledge of the discovery obtained gradually disappeared from the memories of the men who made it. It is believed, from the description, to be the deposit on Mt. Andrew, on Kasaan Peninsula, Prince of Wales Island, rediscovered in 1899 as a result of the recalling of knowledge of the old unlocated discovery. The second note of mineral was the discovery of gold on the eastern shore of Annette Island, about 1891 or 1892, by James Bowden. He and others located claims, but were prevented from working them by reason of the island having been set apart by Congress for the use of the civilized Metlakahla Indians, who had removed there from the neighboring British Columbian mainland. The third notice of mineral values were discoveries made late in 1897 and since as a result of the Klondike discoveries taking many miners into the country. This last discovery has been followed by extensive exploration and some exploitation, and has laid the basis on which is being built the beginning of what will soon be one of the great centers of mining industry in the United States.

Ketchikan, from which the district gets its name, was in April, 1899, a salmon saltery, with a population of about twenty whites and twice as many Indians, all dependent on the salmon fishing business. It is situated on Tongass Narrows, on Revillagigido Island, on the inside route taken by all the steam vessels sailing between Seattle in Washington and Juneau and Skaguay in Alaska. It is at the present time the most central and generally accessible point for all the mines and small mining camps that have been established in the district. Its growth started in 1899 and has continued steady and substantial ever since. At the present time the population is about 750. The town is incorporated, has water works, a fire department, a school, church, three large general stores and mine outfitting establishments, hotels, a weekly newspaper and a large salmon canning establishment. It is a port of entry, and all vessels taking the inside route for Alaska enter and clear there. It is the mail-distributing center for all the other postoffices in the district and the home port of a local steamer line which distributes the traffic which the mining is building up. At Ketchikan there is no mine exploitation under way, though prospecting has developed some possible low-grade gold propositions, the ores, which are pyritic, carrying some silver and copper as well. The different ore bodies are mineralized quartzite dikes and segregated quartz seams in chloritic schists. There is little or no oxidation of the sulphides, and economic values cannot be said to be proven yet.

On Revillagigido Island, on Thorne Arm Inlet, due east of Ketchikan, and 24 miles distant by water, is the Sea Level mine, at the postoffice of Sealevel, E. C. Morse superintendent. The mine consists of two quartz ledges, dipping nearly vertical and separated by a garnet-bearing porphyry dike. The veins average 4 feet in width of clean white quartz carrying free gold. Both veins are operated through one shaft, and levels have been run several hundred feet, blocking out a large body of ore that is expected to mill about \$5 a ton. The contract has been let for a 30-

stamp water-power mill. In the locality of Sea Level, between Thorne Arm and Behm Canal, many other quartz veins and promising prospects have been opened up.

On George's Inlet, also on Revillagigido Island, about 15 miles by water from Ketchikan, a large number of locations have been made, but only assessment work has been done on them. One lode outcrops for 2 miles and is several hundred feet wide. The ore is low-grade, largely silver-bearing galena in a quartz gangue. On the northern side of the island, at Traitor's Cove, some rich gold-quartz pockets have been found on the beach; but the veins, so far as followed inland on the surface, proved small and have not been exploited. Except close to the water's edge and in the particular localities noted, Revillagigido Island has been very little explored for valuable minerals. Fully nine-tenths of the area is untrampled even. The formations generally are highly metamorphic and siliceous schists, and quartz porphyry eruptives. The strike of the formation is N. N. W. and S. S. E. The mineral values, so far as developed, seem principally gold, with silver, lead and copper, in the order named. All three of the latter would commercially seem by-products to mining for gold.

On the mainland of the district there are three widely separated localities already discovered to be mineral-bearing. On Boca de Quadra, an inlet off of Revillagigido Channel, between Behm Canal and Portland Canal, some gold placers have been found and prospected in a small way, and in the country between Boca de Quadra and Portland Canal gold-bearing quartz ledges yielding rich specimen rock have been discovered.

A few prospectors have been up the Unuk river, a considerable stream entering the head of Behm Canal. The country is reported by them to be exceedingly difficult to get about in and prospect. They have, however, found placer gold and some exceedingly rich silver-bearing lodes. So difficult and comparatively remote is this locality that no attempt has been made to develop anything.

Helm Bay, off of Behm Canal, on the Cleveland Peninsula, 24 miles by water from Ketchikan, was the first point in the Ketchikan district to receive fairly close prospecting and actual productive mining development. The Helm Bay area is inclusive of the southern end of the Cleveland Peninsula, taking in mineral discoveries on Union Bay and Vixen Inlet. At Helm Bay proper the developments are of gold-bearing quartz entirely, and are all on the south side of the bay. The country rock formation is diabase, locally altered to serpentine in places and bounded by serpentine on the west. Close to the shore of Helm Bay, and having the prevailing N. N. W. and S. S. E. strike, is a narrow belt of chloritic schists carrying gold-bearing pyrite in knife-blade quartz seams. The body of this material is large, but the grade low, assays showing from \$1 to \$2.50 a ton in gold. In the diabase there are recognizable two distinct quartz vein systems. One of these consists of a series of parallel veins transverse to the rock formation strike and dipping without uniformity of angle to the north. The first discoveries of gold were made in these veins where they were exposed between high and low water mark. The gold is set in the quartz coarse and nuggety and is easily seen among the barnacles and mussels. The quartz, being more resistant to erosion than the enclosing rocks, has been left in relief by tidal erosion. Inland explorations on these veins have developed some pocket deposits, but no ore in milling quantity. The ledges vary from 12 to 60 inches in width and are quite irregular. Galena, mispickel and tellurides have been recognized in some of the ore. The other quartz vein system strikes at right angles with the one described and dips sharply to the east. It is in a system of fissuring running with the strike and dip of the rock formations. These veins are more irregular and have only a distinct foot wall, the mineralization extending out into the hanging wall rock. These veins are gold-bearing, notably so where they cross veins of the other system. The gold is free, occasionally in rich pockets, but forming mill bodies of ore as well. The veins carry pyrite which is rich in gold. The Gold Standard M. Co. own a mine including sixteen claims located on parallel veins of the first described system. Their mining operations are on a vein of the other system. Dyer & Johnson, the original locators discovered in the fall of 1898 a pocket at the surface, from which they took out gold to the amount of \$18,000 in exceedingly rich specimen quartz. The company has put down a 200-foot shaft on this ledge, and opened it by levels. It has a steam hoist and a 10-stamp water power mill with concentrators. The mill is connected with the beach by a 3-foot gauge 30-pound-rail tramway 3600 feet long. The Gold Standard is the leading development on Helm bay and the first in Ketchikan district to have a mill put on it. Notable developments and a moderate aggregate output of gold have been made on a number of other gold-bearing ledges on Helm bay and a 2-stamp mill has been installed on one of the properties by Moran, Charles & Smallwood. This is on the opposite side of the mountain from the Gold Standard. The Keystone mine, J. A. Bradley, superintendent, is being prospected on an extensive scale. The ledge in this mine outcrops boldly on the contact between the serpentine and the diabase. It is about 40 feet wide and carries its gold values in pyrite. The aver-

age grade of the ore is low but the conditions for cheap mining and milling on a large scale are so favorable that it is considered safe to become a commercial proposition. The mineral belt continues northwesterly and at Vixen Inlet a number of prospects have been found. The general character of the mineralization is different, however, from that at Helm Bay, galena, chalcopryite and pyrrhotite characterizing the veins. Work here has not progressed beyond the assessment stage.

Gravina Island is separated from Revillagigido Island by Tongas Narrows. The country rock formations are similar to Revillagigido and the mainland formation in their highly metamorphic character. Siliceous and chloritic schists form the half of the island next to Tongas Narrows. The western half adjacent to Clarence Straits, and including both slopes of the principal mountain range which extends from Dall Head at the southern end to Vallenar Bay at the northern end, is limestone. Both the schists and the limestones contain porphyry eruptives both massive and in dikes, and the limestones in the localities specially mineral bearing are very much faulted.

In the schists the valuable mineral found is gold in quartz veins carrying as a rule very little pyrite. What development has been made on these veins, very little in all, indicates a general direction of strike corresponding to the sheeting of the formations, and dip nearly vertical. The Bell mine owned by Campbell & Co. of Ketchikan, and the Naha mine owned by J. R. Heckman of Ketchikan, are on parallel veins about a half mile apart and 4 miles south of Ketchikan. In both the quartz is laminated and banded in structure, and associated with the quartz as vein filling is talc apparently an altered schist. The veins are strong and wide, 3 to 14 feet. The gold of the ore is largely recoverable by amalgamation, and the remainder in vanner concentrates. The sulphurets consist of pyrite and sphalerite, there being from 2% to 5% of zinc in the higher grade ore. Outside of a rich streak assaying as high as \$50 a ton the milling ore average is low, \$4 to \$6 a ton. The exposure of shoots at the surface indicate commercial qualities of ore. On both claims several prospect shafts have been sunk, the deepest about 50 feet. The two veins briefly described are the most developed of any. Many others prospect on the surface equally well in values and on some, specimen gold quartz has been found.

In the limestone formation the valuable mineral developments are copper, gold, silver and lead in order of relative importance as stated. Discoveries of lodes and prospects have been made at the extreme southern end of the island at Dall Bay and Seal Bay, and at the northern end on the slope of the mountain range toward Clarence Straits. The mountain terminating the south end of the range rises from Dall Bay and Seal Bay. Its upward slope is a series of benches or steps made by vertical fault planes. In fissures made by these faults lenticular bodies of quartz have been found, carrying gold-bearing chalcopryite and pyrite. Many of these are of widths from 20 to 60 feet, others are narrower and more extended in length. The strike of the different bodies has no uniformity. The direction of dip is from the mountain. In some of the fault planes a dike of a basic eruptive, altered to serpentine, occupies part of the fissure and forms one wall of the quartz vein. The veins are very irregular in the quantity of mineral carried, and the average copper per cent and gold content is low. The ore can be sorted by hand and, with the cheap tunnel mining possible, can be made commercially profitable. Considerable prospecting was done during 1899 and 1900, but only assessment work is being done this year. Average ore values can be stated for commercially prepared ore 2% to 10% copper, \$1.50 to \$5 gold and one to five ounces of silver to the ton. The principal developments have been made on the Grotto mine by a company of which W. H. Gilmore of Ketchikan is manager, and on the Dall Head by a Portland, Or., company. The latter operation is temporarily closed down.

At the north end of the island less work has been done. The ore veins carry a somewhat different mineralization. Chalcopryite associated with galena, is characteristic mineralization. The gold and silver values average higher than at the south end. The chalcopryite and other minerals are more evenly disseminated and there is a much lower proportion of pyrite. The ores are commercially concentratable by machinery. On discoveries already made the conditions for mining are hardly as favorable as at Seal Bay. There is less opportunity to get depth by tunneling. The principal work of prospecting—it is not sufficient in amount to call development—has been done by the Hartford Mining Co. of Boston, Mass., A. H. White of Hollis, Alaska, local manager.

Annette Island is a reservation made by Congress for a community of British Columbia Indians who had been Christianized and civilized by the Rev. Wm. Duncan. The settlement of Metlakahla was made in the latter 80's. Congress did not pass the title to the Indians, merely reserved it for the exclusive use and occupancy of this particular community, who moving into the United States were not given citizenship. The area of that island is 125 square miles. The number of Indians in the community is about 500. They actually occupy in only one settlement not more than 2 or 3 square miles. While it was

\*See illustration on front page.



expected that they would make agricultural use of the island they make none whatever. While the island was intended to support them, it is in fact, used for no useful purpose but the site of their town. Many of the Indians are permanently residing at Ketchikan, Saxman and Gravina, and all of them derive their support from working in the mines, lumbering or fishing, exclusively on other islands than Annette, living, working and competing with white men. They are good workmen, and have, organized and going, larger commercial and industrial businesses off of Annette island than on it. To an observer they are maintaining themselves industrially on even terms with the white men. The claim that the exclusive reservation of Annette Island is necessary to protect them against the vices and superior thrift of the whites is not sustained by the facts. They are in continued contact with the whites from choice, maintain equal thrift, and do not acquire the vices. The facts have been stated in some detail because of their pertinence to the mining development of Annette Island. At the time the island was set apart for them the existence of valuable mineral on it was not suspected. The discoveries subsequently made were of gold and silver-bearing ores of marvelous richness. With the non-existence of the reason for the exclusive reservation of the island for the Indians; with no use or occupancy being made of the land by the Indians; with practically an entire failure to accomplish the intent of Congress in making the reservation; with these real facts and conditions what they are; Congress should throw open all of the island except the settlement now occupied by the Indians.

The prominent physical feature of Annette Island is a mountain summit about 3500 feet high east of Metlakatla and occupying the central portion of the island. From its northern end a range of lesser summits extend to the northern end of the island. Among the peaks of the latter are two said to be old volcanic cones. The country rock formation where the mines have been discovered is stated to be a limestone, similar to that characteristic of the Dolomi locality on Prince of Wales Island, described further on. Specimens of ores from the two widely separated points are characteristically identical in mineralization and physical appearance. The discoveries that had been made up to the time when the prospectors were evicted from them and the island, were made on the east coast, the section beginning about 5 miles northwest of Mary's Island and including the coast for 7 miles northward. The prospectors state that they found the area extending from this shore line to the western shore of the island all mineral bearing. The veins are quartz, carrying silver-bearing tetrahedrite and free gold. The percentage of silver in the tetrahedrite would seem to approximate 30% from the figures of partial analysis. Assays showing silver values from 600 ounces to 2000 ounces to the ton are common with ores from this locality. Gold values also run into the hundreds of dollars to the ton, though not in ore with the high silver values. The gold appears to be in the quartz where there is little or none of the silver-bearing mineral. Several prospecting shafts were sunk on different veins and shipments of ore made before the mining was stopped. Nothing has been done on any of the claims since then. The Indians started to mine after the prospectors had been driven away; but, on the protest of the latter, the Indian Department stopped the mining, ruling that there was nothing in the Act of Congress making the reservation which permitted mining.

Dall Island has received some attention from prospectors and a number of discoveries of gold lodes have been made opposite Jackson P. O. Only preliminary prospecting and assessment work is under way on the island at the present time.

Kosciusko Island, like Dall Island, one of the Prince of Wales Archipelago, is commonly spoken of as if it were part of the principal island. The settlement of Shakan is on Kosciusko Island, and not on Prince of Wales Island. At this place there is a large saw mill, a halibut and herring fishery plant, a marble quarry and a gold-bearing quartz mine equipped with a stamp mill. This locality has not been developed from Ketchikan, but from Wrangel. It has been a port of occasional call for Alaska steamers, and is on a local steamer mail route from Wrangel to fishing stations and Jackson, on the west coast of Prince of Wales Island. The marble quarry is being prepared for exploitation on a considerable scale by a Fargo, North Dakota, company, for which M. Cronin is manager. It is less than half a mile from the steamer landing. A plant of marble cutting machinery has been put in place. The quality of the rock is claimed to be superior. It is sound even at the weather exposed surface, and is expected to enter the Pacific coast market in competition with marble brought from Italy in sailing vessels. The gold quartz vein, owned by Castle & Co., was discovered in 1898. It is a wide vein of low-grade ore, most of the values being carried in pyrite.

Duke Island, south of Annette, is uninhabited and has been little explored for mineral values. It is stated that a gold-bearing quartz vein has been found on the island, and also that an outcrop of coal is exposed on the beach.

Wrangell, Zarembo and Etolin Islands are out of the natural prospecting range from Ketchikan and

so far as known have not been prospected from Wrangell as a base. The latter place has never had the same kind of a pioneer class as Ketchikan, men who while sailors and fishermen by trade were miners from opportunity.

Prince of Wales Island is 130 miles long and from 10 to 40 miles wide. Its area is 2650 square miles, and its coast line following it into all the inlets and harbors is not less than 800 miles in extent. Practically all of the island that has been explored has been found more or less mineral bearing. Except in the central section including the region of Kassan Bay and Cholmondelay Sound the exploration has not gone far inland from the coast. The section of the island north of a line drawn west across the island from Tolstoi Bay has not been prospected even along the beaches. In the partly explored portion of the island there are several centers of mine development, each rapidly growing into economic importance. These are, the Kassan Peninsula or Mount Andrew, Hollis, Skowl Arm, Cholmondelay Sound, Dolomi, Niblack and Copper Mountain.

The Kassan Peninsula or Mount Andrew section includes the area between Kassan Bay and Clarence Straits. At the extreme point of the peninsula is the postoffice and small settlement of Grindall. With increasing development on Prince of Wales Island it will eventually become a port for the landing by the Alaska steamers of the traffic for the Kassan Peninsula mines. Three miles northwesterly from Grindall on the Clarence Straits side is the Allison copper mines, and adjoining further northwesterly the Mount Andrew copper mine. Seven miles northwesterly on the Kassan Bay side is the postoffice of Kassan and the Copper Queen group of copper claims. These are the principal mines measured by present developments, but the number of claims of less development and unknown possibilities is in the hundreds.

The country rocks of the peninsula are all eruptives—diorite, quartz-porphry, serpentine, being most in evidence. In the Allison mine the ore is chalcopryite associated with magnetite in a hornblende gangue. In the Mt. Andrew mine, and in the majority of the claims on the peninsula, the ore is chalcopryite, partly massive in seams in massive magnetite, partly disseminated with pyrite in the massive magnetite. At the Copper Queen the ore is chalcopryite, in bunches and masses in the country rocks, and associated with manganese oxide and magnetite in veins. Some large deposits of hematite are reported, which are believed to be the iron capping of rich copper deposits.

At Tolstoi Bay Patrick Clark of Spokane, Wash., is boring in one of these deposits with a diamond drill.

The Mt. Andrew mine is owned by S. Linkenstadter, Henry Bratnober and some London people. The exploration of the property, now in its third year, is in personal charge of the first named. Mt. Andrew is a peak about 1200 feet in elevation. The ore body takes in the summit of the mountain and extends far down the slopes to the north and south. Its width is known to exceed 1500 feet and its length is more than 5000 feet. This exposure of ore is magnetite. In it are numerous lenses of nearly pure chalcopryite from a few inches to several feet in thickness. Much of the magnetite does not seem to contain a trace of copper. Enormous masses of it contain disseminated chalcopryite associated with pyrite. It would seem as if the entire mineral mass could be utilized. Mining is simply quarry work. Done with machine drills, it should cost no more than mining the hard iron ore in the Michigan ranges, \$1 a ton at the outside. Its own gravity will transport it to the water's edge or reduction plant. Pulverized, it can be parted dry by magnetic separators. One product will be clean magnetic iron, which, compressed into briquettes, will be the raw material for the manufacture of iron or steel. The other product will contain the chalcopryite and pyrite, with all the gold and silver in the original ore, titanic iron, silica and other waste. The concentration raises the copper percentage, and gold and silver content to commercially recoverable values. A test of magnetic concentration made with a sample of the disseminated ore containing 3.20% copper, \$1.20 gold and 1.5 ounce silver to the ton produced 80% of magnetic iron and 20% of the mixed sulphides and waste. The latter assayed 15.6% copper, \$6 gold and 7 ounces silver a ton. The magnetic iron showed only a trace of copper and silver.

Hollis is a district of high-grade free-milling gold ores. The first discovery—the Crackerjack—was made by James Bowden, now the superintendent of the mine, late in the fall of 1899. The town of Hollis was started in the spring of 1900, and a large number of other ledges of high-grade gold quartz were discovered that year and this. Hollis has become a business center of considerable importance. It is situated on a beautiful land-locked harbor off of Twelve Mile Arm, a branch of Kassan Bay. It has a store, assay office, hotel and several other business houses. The mines are from 1 to 5 miles back from the town. The country rock formation is metamorphic slate and porphyry eruptives in dikes. The metamorphism of the slates has not produced the hard siliceous schists to which frequent reference has been made. The formation greatly resembles the mother lode formations in Tuolumne county, Cal. The ledges follow contacts of the dikes with black

graphitic slates. Not only the quartz is gold-bearing, but the gold values are carried in the shattered slates more or less mixed with the quartz. Narrow foot wall seams of high-grade quartz that it pays to mortar out at the mine are common. From nine pounds of quartz from a 6-inch streak in the Puyallup mine \$40 was pounded out in a mortar. High-grade ore that will stand shipment has also been developed in quantities in many mines. The first shipment of the Crackerjack mine returned \$225 a ton net after all charges were paid. While the major part of the values are free, the pyrite and mispickel which constitute the sulphurets assay from \$600 to \$1100 to the ton. Well-built trails lead from Hollister back to the mines, and several of the developed properties are building rail trams to enable shipments of ore to be made economically. The milling character of the ore will justify the erection of a number of free-milling plants. There is much ore that will pay well milled on the ground that would not pay transportation and smelting costs.

At the head of Skowl Arm, a branch of Kassan Bay, 2500 feet above the sea level and 2 miles back from the water, is the Khayam copper mine, George McKenzie superintendent. The mine is at the surface a great chimney of chalcopryite ore 600 feet by 400 feet in a hard syenite formation. A tunnel has been driven in opening it up at a depth of 100 feet, and a second tunnel is now being run which will open it 400 feet down. The plans of the company provide for the construction of a wire cable tramway down the mountain to tide water. There are many other locations in the locality but no development work. A discovery of nickel-bearing phyllosilite is reported.

Cholmondelay Sound is an arm of Clarence Straits with many branches, one of which heads within four miles of the head of Copper Mountain Bay on the west side of the island. The portage is a low divide barely above the sea level. A good trail has been built across it to Copper Mountain camp, and it is used as part of the mail and light traffic route from Ketchikan to that place. It cuts off 75 miles of steamer travel around Cape Charcon at the southern end of the island. On Cholmondelay Sound there is a postoffice and small town, Sunnyside. Mining on the land bordering the sound has been largely locating claims and doing assessment work to keep them alive. In only a few cases has there been any planned development work. Discoveries have not focalized to any center, but locations have been made on over a very widely extended area. Copper ores are prominent but galena is markedly abundant. Gold-bearing free-milling quartz has been found and is being developed. The finds are not so far high grade as in Hollis camp. There are many large ore bodies carrying values in sulphides, low grade, but with possibilities of commercial value as concentrating propositions.

Dolomi is the smallest in area of any of the districts. It is a postoffice and small settlement on Port Johnson, a small perfectly land-locked harbor comparable with the harbor at Hollis. The place has a large sawmill, store, wharf and excellent trails and tram roads leading to the mines.

The country rock formation is limestone, generally a clean white crystalline marble. Basic-porphry dikes are intruded into it extensively. It has also been extensively fissured in lines, both with the dikes and across them. In these fissures quartz veins have been formed that are gold, silver and copper bearing. These veins seem to lie in two systems of strike with dips, usually very flat, to the north or east according to the system. The foot wall of these veins is usually free and well defined, though there is no trace of gouge. The hanging wall is invariably frozen. The veins carry free gold, silver-bearing tetrahedrite and pyrite, the latter finely disseminated. So far as a generalization can be made, the veins where highly gold bearing do not carry much silver-bearing tetrahedrite, and where they carry the latter there is little or no gold. Nearly contiguous veins will show, from the one, gold of exceptional fineness, 990 in one case, and from the other, exceptional fineness of silver, equal to that of the gold instance. The gold-bearing veins show no chalcopryite mineralization, but there are some veins showing it which, while they look promising, do not carry commercial values. The limestone of the locality is notably full of caves. These caves in a number of instances follow the veins on their dip and have disintegrated and washed out considerable sections of quartz. The caves go down below the sea level, and indicate that the recent regional movement of the land surface is towards submergence. Possibly it is continuing now. It is a fact tending to sustain a conclusion that the coastal lands are sinking, and not raising, as has been suggested by geologists.

The principal mines of Dolomi Camp are the Valpairaiso and Golden Fleece. The former includes, it is stated, about fifty locations, of which one is being developed. This one, the Valpairaiso, is on the north side of Paul Lake, about 1½ miles from tide water at Dolomi. A plank tram walk, half a mile long, connects the harbor with the lake. Boats are used on the lake and a rail inclined cable tram from the shafts completes the transportation line over which ore is taken from the mine to the harbor for shipment. The Valpairaiso ledge averages 7 feet in width, the 2 feet on the foot wall being high grade shipping rock. A shipment of thirty-five tons taken in sink-



ing two shafts to 40 feet in depth returned \$185 a ton. A third shaft is being sunk at the present time. B. A. Eardley of Pacific Grove, Cal., and others are owners of the mine, and Wm. Buttrick is superintendent.

The Golden Fleece mine, owned by the Golden Fleece M. Co. of Seattle, Wash., A. F. Knight, superintendent, is 1½ miles north of the harbor. It is developed by two tunnels and two shafts, and equipped with a one-stamp prospecting mill, which is kept crushing ore said to pay \$40 a ton. A number of other ledges have been prospected by surface works, cuts and shallow shafts, very generally showing values that justify development. There is a notable identity of characteristic ore between the ores of this district and of Annette Island.

Niblack's Camp is 3 miles in an air line from Dolomi. It includes the peninsula between Johnson Inlet and Moira Sound, and both sides of the North Arm of Moira Sound, including Niblack's Anchorage, a sheltered land-locked harbor off of the junction of the two bodies of water. Between Dolomi and Niblack the country rock formation changes. The limestone gives way to greenstone. The line of contact is close to Dolomi and runs northwest, the limestone covering the head of North Arm and continuing to Cholmondelay Sound.

The valuable mineral of the greenstone formation is copper in chalcopryite. It is gold-bearing, and associated with pyrite and magnetite. In the limestone formation galena appears with chalcopryite in strong veins around the head of North Arm and in the country extending from there to Cholmondelay Sound. The veins in the North Arm locality carry galena, which is absent in the limestone of Dolomi, and do not carry tetrahedrite, which is characteristic of the Dolomi ores. The occurrence of chalcopryite in commercial quantities in the ledges of the limestone of North Arm, and not in the Dolomi section, is another characteristic difference.

At Niblack Anchorage in the greenstone formation a discovery, made late in 1899, of a strong 30-foot quartz ledge carrying chalcopryite associated with pyrite and magnetite, is being developed by a Portland, Or., company. The ore carries from 6% to 8% of copper, \$2 to \$4 in gold and about 3 ounces silver. Several small trial shipments have been made and the work being done is intended preliminary to large scale exploitation. Opposite Niblack, near the summit of the greenstone mountain, occupying the peninsula south of Johnson Inlet, is a 300-foot wide vein, carrying chalcopryite very finely disseminated in a quartz gangue. The ore is similar in physical character to ores at the north end of Gravina Island, except that there is no galena. There is an absence of pyrite in the ore and a rather high average of gold values. The foot wall streak assays about 15% in copper and from \$6 to \$20 in gold, some assays going

much higher in gold. The main body of the ore carries good commercial values. The mine is a quarry, and the ore is almost ideal for concentration by wet methods.

Copper Mountain, or Coppermount, as the post-office is named, is a 3500-foot high mountain alongside of the head of Copper Harbor, an inlet from Cordova Bay, on the west side of the island. It is, however, practically as accessible through the low divide from the head of Cholmondelay Sound as many of the east side mines described. On the mountain, well up toward the summit, there are a number of lodes of copper ore of such great width that they are minable as quarries. The formation is the western extension of the limestone formation of Dolomi Camp. The surface ores are much oxidized and concentrated. Malachite and native copper occur along with chalcopryite, forming ores of shipping grade that go 20% and upward in copper and carry large values in gold and silver. A few miles northwest of Coppermount, in the mountains surrounding another inlet from Cordova Bay, the ledge carries silver-lead ores. Some shipments have been made and have paid, despite very heavy transportation costs and the low price of lead. These lead-silver developments are still in the hands of prospectors, but the copper mines at Coppermount during 1900 and this year have been exploited commercially by strong capital.

Besides the many promising undeveloped claims in locator's ownership yet, three large properties have been created by aggregations of claims. Easily the first of these in development is the original Copper Mountain or Mellen mine, lately sold by the taking up of the development bond the property has been operated under, for it is reported \$500,000, and a fourth interest reserved to and carried by the purchasers for Mellen & Sylvester of Juneau, Alaska, the original owners. The purchasers are Butte, Mont., people, S. I. Silverman of Spokane, Wash., manager. Ore is being quarried out 3200 feet above the sea level and let down by a gravity suspended cable tram to bins on a wharf at Copper Harbor. The slope of the mountain is so steep that the tram line is less than a mile long. The ore is shipped in 100-ton lots without sacking and is reported to return \$65 net a ton after all costs of mining and transportation and smelting charges are paid. The company is putting in a tunnel at 500 feet elevation, which will give 2800 feet depth below the highest outcrop and will cut two smaller veins before the main vein is reached. A large nearby water power has been utilized to operate an air compressor permitting the use of power drills in the lower tunnel.

The Alaska Industrial Co., including Senators J. P. Jones, ex-Senator Pettigrew, Congressman Sulzer and other New York people, is developing an even larger aggregation of claims than the Copper Moun-

tain, under a Mr. Scott as manager.

The Spokane Dev. Co., of which Patrick Clark of Spokane, Wash., is the principal owner, is doing development work on a large scale on the Copper Boy mine. James Harvey is superintendent. There is no difference in the grade or quantity of the ores or the physical conditions for exploitations which should make these last two mines less desirable than the Copper Mountain.

Moira Sound, McLean's Arm, Nicholl's Bay and Hunter's Bay localities have all become known from discoveries of copper or gold ores. None of them have received anything more than the surface scratching of prospectors. Capital has not been so plentiful in the district that it could cover all the discoveries no matter how promising.

The physical conditions which determine the facilities for mining industry in the district are as follows:

The climate is temperate, rather than Arctic. Despite the high northern latitude, there is little severe cold, the temperature rarely going below 10° F. at the sea level. The water in the heads of some of the inlets, receiving considerable fresh water, freeze up in winter for a few weeks sometimes. The temperature on the western side of Prince of Wales Island is slightly warmer in winter than the eastern side, and the latter is two or three degrees warmer than Ketchikan. Work is at no time prohibited by cold. The rainfall, and in the high altitudes the snowfall, is excessive. There is little or no dry weather in summer. Differences of weather can be defined as more rainy or less rainy.

Timber is abundant. The varieties are spruce, red and yellow cedar and hemlock. The trees are large—spruces from 10 to 14 feet in diameter are not uncommon. The yellow cedar is a beautiful grainless wood, too valuable for mining use. Hemlock is too heavy to log to advantage. The red cedar is good for mine timbers. The spruce makes fair common lumber, but is too soft for mine timbers or mill framing. It is a superior wood for pulp making. There is no lack of timber for all prospective mining use.

Coal is reported to exist on Duke Island, in land adjacent to Karta Bay on Prince of Wales Island and on the Cleveland Peninsula near the Yes Bay salmon cannery. The quality is not known. Coal of good quality is found in the north end of Graham or Queen Charlotte Island, about 50 miles south of Prince of Wales Island. It is in British Columbia and would have to pay duty. Its nearness to the point of use would offset the tariff as compared with coal brought from Washington. If it is a coking coal it would be available at a slightly cheaper cost in the form of coke than coke from Vancouver Island. The cost of freight on the latter, 500 miles on the inside steamer route, with return freight of ore or metal, should not exceed 75 cents a ton. This refers to

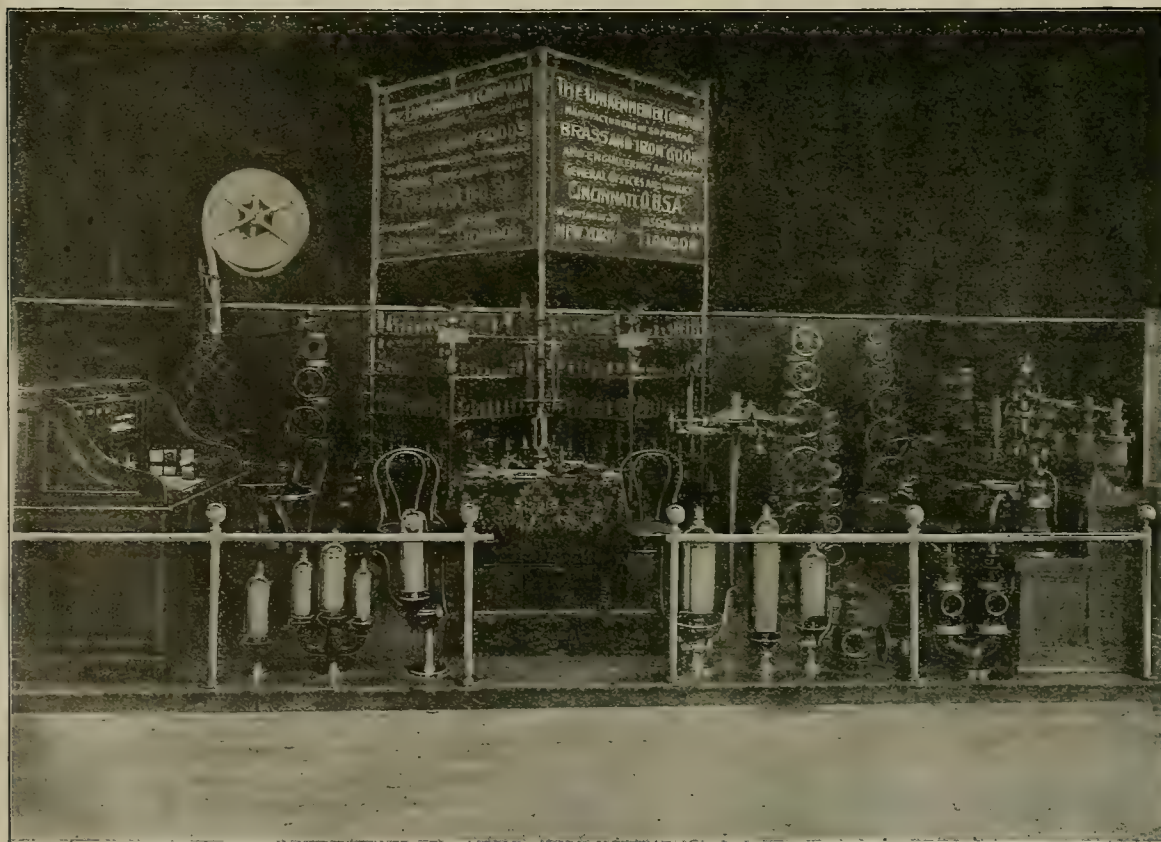
special colliers like the Great Lake vessels towing barges. Fuel oil from California, 1500 miles outside route in special tank steamers, with return freight of metal, could deliver oil so that it would cost not more than 80 cents a barrel.

The water transportation both inter-island and to Puget Sound can be made exceedingly cheap. The entire western coast of Prince of Wales Island can be navigated in sheltered waters behind islands that may yet prove rich in minerals. There are many safe land-locked harbors on the eastern shore. Other islands are equally favored. At many points where there are no harbors, piers can be built and landings made in fair weather. Most of the mines can have landings at the nearest water. The cost of freight of ore or metal to Puget Sound ports in special steamers can be made as low as \$1 a ton. Rates offered now are as low as \$2.50 a ton, except from Coppermount.

Land transportation has to be solved by aerial cable carriers and trams. Roads and trails, owing to the moist climate, cannot be made any cheaper in installation and cost more to operate. The land transportation by suspended cable can be made as cheaply as anywhere in the world, and about every mine can have a line operating by gravity and delivering the mine products by the side of the open sea.

Water is in abundant supply for ore concentration and power development use. The water plants for power development will be comparatively inexpensive. The streams are short, with high grades. They are fed from mountain snows and can be depended on for from nine months to the full year. Electrical transmission lines can be short. The water power can be anticipated to be as cheaply developed and operated as the best yet made anywhere.

The mining of ores is notably a matter of quarry or tunnel opening. A maximum of machine work and minimum of



Buffalo Exposition Exhibit of "The Lunkenheimer Co."

The exhibit at the Pan-American Exposition of "The Lunkenheimer Company" herewith illustrated is installed in Section 46 in the Machinery and Transportation Building. For visitors to the Exposition, who are interested in brass and iron steam specialties and engineering appliances, F. L. Swanberg, who is in charge of the exhibit,

would be pleased to explain them. There are on exhibition a line of regrinding valves, handy valves, lever throttle valves, pop safety valves, plain whistles, fire alarm whistles, injectors, sight-feed lubricators, oil cups, grease cups, glass cups, glass body oil pumps and brass valves and fittings for marine work in medium and extra heavy patterns. The headquarters of the Lunkenheimer Company are in Cincinnati and they have branches in New York and London.



manual labor is possible. Mining by shafts is about the same proposition as everywhere except that power will be cheaper.

Prince of Wales Island is fairly to be considered a commercial proposition. In the five noted localities in which copper is the leading metal developed and in the two in which quartz gold is predominant, minable values in enormous quantities have been proven. That is to say, the raw material of wealth from minerals exists; the problem is simply the realizing of it at the least cost, all things considered. In a general way it can be stated that any kind of plant can be installed without a single item of extraordinary cost. The maintenance of labor, the cost of living, is cheaper than in any interior mining district in the United States. The cost of transporting production to market can be made the lowest of any district in the United States.

There is at hand the raw material for the building up of an iron and steel industry similar to that lately started at Sydney, Cape Breton Island, on the Gulf of St. Lawrence. Prince of Wales Island has the iron and the limestone, and coal fuel is closer to these than the iron is to the coal and limestone at Sydney. Should there be coal in Karta bay the iron, coal and limestone are together by the open sea. Prince of Wales Island has China for a market at shorter distance and cheaper transportation cost than any competitor, just as Sydney has the transportation advantage for Europe over Pittsburg. The conditions for continuous operation throughout the entire year are much better at Prince of Wales Island than at Sydney.

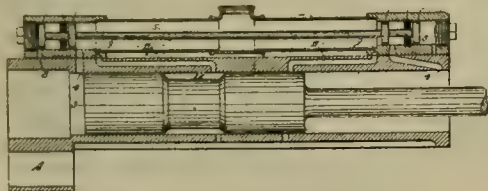
In the production of copper the mines of Prince of Wales Island and of Ketchikan district certainly have the advantage of the minimum possible costs of mining and ore reduction. The present shipment of ores is a temporary expedient incident to the prospecting of the deposits. The conditions for reduction of the ores at the mines admit of lower ultimate costs than can be gained by shipment. The indications all point to the rapid and enormous development of the copper production.

## Mining and Metallurgical Patents.

Patents Issued August 27, 1901.

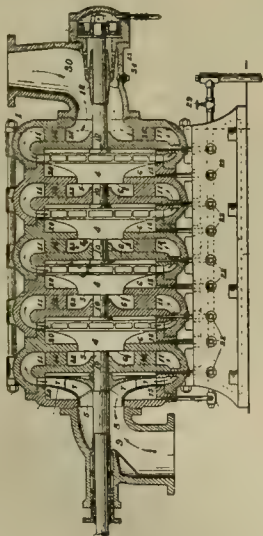
Specially Prepared for the MINING AND SCIENTIFIC PRESS.

ROCK DRILL.—No. 681,504; C. Hultquist, Jerome, Ariz.



A cylinder and a piston reciprocable therein, a chest extending approximately same length as cylinder and having a valve chamber at each end, chest having propelling medium intermediate of chambers and common to both chambers, separate inlet and exhaust ports for each valve chamber, connecting directly with cylinder, a valve rod operating in chest and a double valve at each end of rod, and controlling admission of propelling medium to and from cylinder, and connections of ports for permitting propelling medium to pass from front to rear of valves to actuate valve rod.

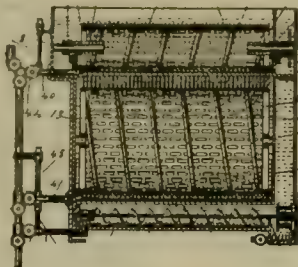
HIGH-PRESSURE ROTARY PUMP.—No. 681,581; J. Richards, San Francisco, Cal.



A series of separate and separable pump casings, having interior chambers bounded peripherally by circular walls, a driving shaft passing through all chambers in line of axis of their peripheral walls, impervious disk partitions in chambers surrounding

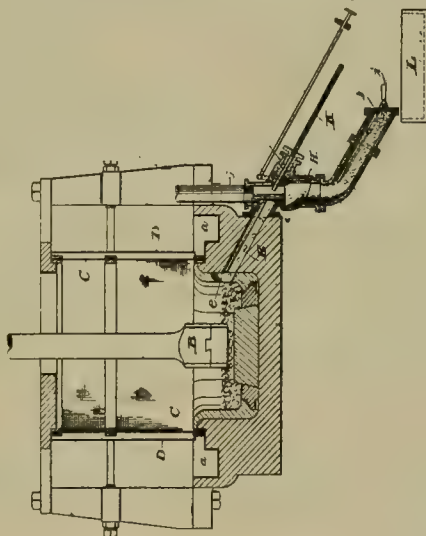
shaft and dividing each chamber into two waterways in communication by means of an annular peripheral passage formed between disk edges and circular wall of chamber, impeller on shaft in one waterway of each chamber, all impellers having suction inlets central and facing same direction, removable annular throatings provided with inclined partitions interposed between impellers at their peripheries and entrance to annular peripheral passages, impellers forming running joints with entrances to throatings, other waterway of each chamber forming a direct communication by shortest path between peripheral passage and inlet of next adjacent impeller, each impeller except first being supported from discharge waterway of adjacent preceding chamber.

AMALGAMATOR.—No. 681,232; E. J. Kiss, Fort Wayne, Ind.



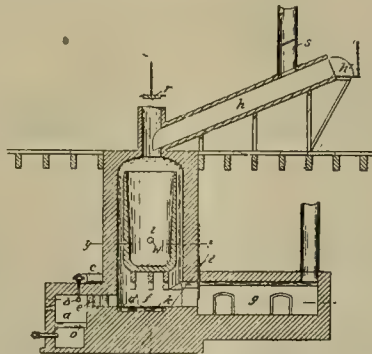
An upright tank having a laterally-extended chamber on one end; a pair of cylinders revolvably mounted one above the other in tank; a driving chain operatively connecting cylinders; a pair of mercury receptacles in co-operative relation with cylinders; a screw conveyor rotatably mounted in bottom of tank and dipping into a body of mercury; an inclined chain conveyor arranged in chamber and adapted to discharge ore from machine; and means for actuating screw conveyor and conveyor chain.

ORE CRUSHER.—No. 681,234; C. H. Krause, South Lake Linden, and H. C. Krause, Point Mills, Mich.



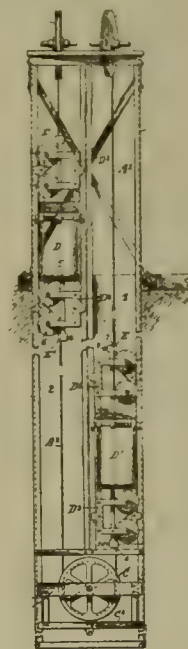
A stamp and mortar for crushing ore and screen through which crushed ore is discharged by splash from stamp, an auxiliary discharge for free metal too large to pass through screen, consisting of conduit leading downwardly out of mortar and water supply connection leading into conduit and adapted to produce an upward current through the same.

COMBINED ORE HEATING, ROASTING AND SMELTING FURNACE.—No. 681,354; S. M. Trapp, Seattle, Wash.



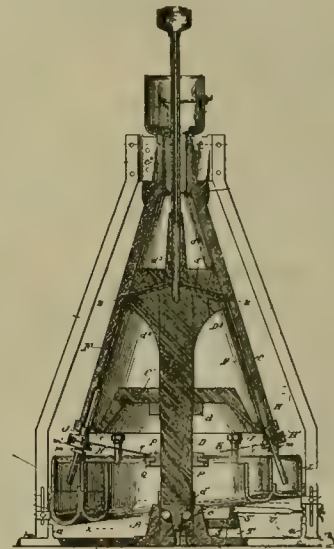
A combustion chamber, a stationary crucible located therein with its top open and its sides free from walls of combustion chamber, a passageway leading from crucible and terminating in tap hole, and forehearth connected with passageway and entirely located within combustion chamber.

HOIST MECHANISM FOR MINE SHAFTS.—No. 681,430 T. J. Barbour, San Francisco, Cal.



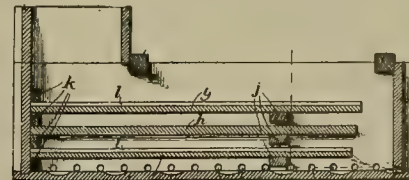
In a single-cable hoist apparatus for mine shafts, the endless hoisting cable, of opposing cable cages, devices carried by cages whereby endless cable is guided above and below same, and means whereby cages may be held locked to or released from endless cable without requiring cages to be removed from cable in order to permit of its position being varied in accordance with working level of mine shaft.

ORE CONCENTRATOR.—No. 681,271; P. H. Shue, Ouray, Colo.



A casing having collecting passages in sides, discharge tubes in passages formed with lateral openings, tubes provided with openings adapted to register with openings in discharge tubes working in discharge tubes, mechanism for adjusting interior tubes, and means for actuating mechanism during movement of machine.

FEED BOX FOR ORE CONCENTRATORS.—No. 681,561; J. H. Michelsen and M. L. Borglum, Butte, Mont.



A feed box, rectangular in outline, provided with feed hopper at one end, a row of discharge holes near bottom, series of grooved shelves of different lengths arranged one above the other, each shelf being separated from one of the sides of box by a space arranged alternately on different sides of box.

PROCESS OF GENERATING CHLORINE AND TREATING ORES WITH SAME.—No. 681,059; E. D. Kendall, Brooklyn, N. Y.

Process of treating ores containing precious metals, which consists in subjecting them to action of acid salt, having formula  $\text{Na}_2\text{SO}_4$ ,  $2\text{H}_2\text{SO}_4$  and a chlorine-containing body.



## MINING SUMMARY.

Specially compiled and reported for the  
MINING AND SCIENTIFIC PRESS.

### ARIZONA.

#### PIMA COUNTY.

The Arizona Copper Hill M. Co. of Denver, Colo., expect to make a sale of their mine, near Tucson, to another company for \$2,000,000. They have a 68-foot vein of 5% leaching copper ore; and if the sale is made, a large leaching plant will be erected.

N. H. Matas of Tucson has struck a rich body of ore carrying free gold at his mine in the Canada Del Oro district, near Tucson.

N. P. Allen, Supt. Eureka Dev. Co.—a Calumet, Mich., company—is developing some bonded claims near Tucson.

M. Delaney, manager, has started work on the old Spanish mine, above Goldfield. The property is believed to have been worked generations ago by Spaniards. C. Wing of New Mexico is interested in the company, of which J. E. Walker of Tucson is president.

The Oceanic mine, near Arivaca, has begun shipment of high-grade gold ore to the sampling works. The first lot assayed \$180 per ton. The production of high-grade ore is about ten tons per month, the rest of a 2-foot vein extracted being stored pending the erection of a mill. C. R. Wores, owner, is now arranging for a steam hoist and pump of a capacity to sink the shaft 500 feet deep, 200 feet below the present depth, when a mill will be erected. H. R. Bacon is Supt. of the mine.

#### COCHISE COUNTY.

A. C. Siebolt of Denver, Colo., who has a bond on R. Welch's copper claims, near Bisbee, has commenced work under a Mr. Ford of Bisbee as Supt. A shaft is to be sunk 250 feet to prospect the ground.

#### COCONINO COUNTY.

The Last Chance mine and millsite in the Grand canyon has been sold by R. H. Cameron, E. I. Gale, P. D. Berry and N. Cameron to H. T. Barbour, representing Eastern people, the price being \$35,000. Work will begin at once on the mine. C. H. McClure is Supt.

#### YAVAPAI COUNTY.

A strike has been made on the Hammer claim, one of the White Horse Co.'s properties, near Prescott. The ore, which is quartz and hematite, was found in shaft No. 3, and tests made of the value show that it will mill \$100 a ton. Mr. Monroe of New York is local manager.

### CALIFORNIA.

California State Mineralogist Aubrey announces that Bulletin No. 22 is now ready and can be obtained by sending 5 cents to the Bureau for it. It consists of a compilation of the values of all the mineral productions of California in the past fourteen years, and up to Jan. 1, 1901. It shows the increase of the industry during that time, and is intended as a statistical reference book.

#### ALAMEDA COUNTY.

It is reported that Eastern capitalists are buying a large tract of land in East Oakland on which to establish a smelting plant.

#### AMADOR COUNTY.

At the Fremont mine, near Amador City, work is being done in shafts Nos. 2 and 3. A drift is being run from the 640 level of No. 3 shaft to the 700 level in No. 2 shaft. The mine is operated by Goodall, Perkins & Co. of San Francisco.

Mr. Dickerman, superintendent of the Altaite mine at Rancheria, states that the tunnel is now in 412 feet, and is expected to cut the ledge in a short time.

The foundations are completed and part of the framing is up at the new 20-stamp mill at the Keystone mine. The old 40-stamp mill is now running with electrical power from the Standard Electric Co. Supt. W. A. Prichard says that the mill runs a great deal steadier, and the concentrators work better with electrical power than with water.

#### BUTTE COUNTY.

C. E. Kusel of Oroville has sold forty acres of land in the dredger belt near Oroville to J. W. Goodwin. The price is stated to be about \$10,000.

#### CALAVERAS COUNTY.

At the Napoleon copper mine, near Telegraph city, the 300-foot shaft has been cleaned out and timbered. A good-sized body of ore was found at the bottom of the old shaft. This mine has been idle for nearly 30 years, but the present owners, Williams Bros. of Bisbee, Arizona, propose if the ore turn of good quality and sufficient quantity to erect a smelting works at the mine.

Operations at the Arent mine, at Cop-peropolis, have been suspended temporarily,

owing to a failure of the machinery to work the gravel. A stamp mill will probably be put in.

F. F. Carnduff of Biggs, Butte Co., is taking options on some lands in the Calaveras river bottom and buying others between Jenny Lind and Hunt's Landing. A drill will be used for prospecting, and if satisfactory returns are had a dredger will be put on the property.

The Calaveras M., Water & Power Co. has been incorporated at San Andreas. The directors are A. Schloss, C. J. Pence, R. Ostrom, D. Fricot, G. Ostrom and L. Pence. The company has secured large water rights and propose to build reservoirs on sites which have been secured. The company will work the Round Butte gravel claim, bought from Stewart & Doolittle, by hydraulic mining.

#### EL DORADO COUNTY.

The 10-stamp mill at the Mt. Pleasant mine, at Grizzly Flat, is now running. The installing of the new compressor is completed.

#### HUMBOLDT COUNTY.

The Orleans M. Co. of Orleans Bar has finished piping to cut bedrock and repair the flume. It is understood that the season was a very successful one.

#### INYO COUNTY.

A mineral map of Inyo county has been completed by the State Mineralogist and a register of the mines and mineral localities is in preparation.

#### NEVADA COUNTY.

(Special Correspondence).—The Mary Jane drift mine on Fall creek, 9 miles north of Emigrant Gap, has been bonded by Esther, Hyatt & Co. of this place to a local company, who are running a new tunnel and are now in 500 feet. They expect to bottom the channel and find the old King lead, which in an adjoining mine yielded \$800,000 a few years since.

Emigrant Gap, Aug. 30.

A San Francisco company, headed by A. D. Gassaway, formerly Supt. of the West Harmony mine at Nevada City, has bonded the De Noon ground above North Bloomfield, and will open it in a systematic manner. Arrangements have been made with the Derbec Co. for land which will be used for buildings and works. A 5000-foot bedrock tunnel will be run which will tap the channel in the De Noon ground where the Derbec Co. left off. It is expected that the tunnel will be completed in about a year.

The Crystal Lake M. Co. has bought the Hartley mines in Meadow Lake district near Cisco and is erecting a 10-stamp mill.

#### PLACER COUNTY.

(Special Correspondence).—The Red Rock quartz mine, 2 miles from Blue Canyon, has a 10-stamp mill in steady operation on paying mill quartz. The tunnel now has 10 feet of ore in the face. H. B. Wiley is the owner.

The Stockton mine, between Blue Canyon and Towle, has two ledges with ore running from \$6 to \$14 a ton. A road is being built preparatory to putting in a 10-stamp mill.

The Paramount mine at Shady Run is running a 5-stamp mill and supplying it with ore from a tunnel.

The Blue Lead at Dutch Flat, owned by Sacramento people, W. H. Bellows Supt., is running a crosscut through the channel to determine pay gravel values.

Blue Canyon, Aug. 31.

The Girard G. M. Co., which has been running four stamps at their mine near Cisco, has recently added four more stamps.

W. J. Dingee of Oakland is at the head of a company developing quartz claims southeast of Cisco on the American river.

At the Lost Emigrant mine near Cisco the shaft has been sunk 100 feet. The last shipment of ore returned \$135 per ton.

#### RIVERSIDE COUNTY.

R. P. H. Laney of Picacho and Ehrenburg is interested in a new gold and copper find opposite Ehrenburg and about 27 miles west of the Colorado river. The ore is rich in gold and copper. The outcroppings covers thirteen claims. Laney and his associates, F. Guerra, J. E. Carl, J. S. White and S. Temple are making arrangements to do development work.

#### SHASTA COUNTY.

The Midas M. Co. has been sued by J. Ceumbs, W. R. Bigelow and M. C. Jordan, who claim to be prior appropriators of the water of Brown's creek, which the company also claims. The suit is for this water. J. H. Roberts of Sacramento is president of the Midas Co.

It is reported that the Balaklala M. Co., near Kennet, had made a new strike in the mine in a tunnel Supt. Ellis has been driving to prospect a new piece of ground. The new body of ore is said to carry a high per cent of copper and a big value in gold and silver.

E. Holden and R. J. Jennings of Redding have bonded for a year at \$1500 the

copper claim belonging to C. F. Daugherty and L. M. Lane. The claim is located on Mears creek, 3 miles from Sims.

P. M. Moore and R. Smith have sold six claims on Minnesota mountain, adjoining Bully hill, to F. H. Kline for \$8000 cash. These claims were worked years ago, then abandoned and recently relocated. The tunnels had been run and the locators, Moore and Small, had done practically no development work. Kline bought for Leadville, Colo., people.

#### SISKIYOU COUNTY.

A copper ledge has been discovered on the western side of Siskiyou mountain, about 8 miles from Garretson's medical springs, 22 miles from Oak Bar, 5 miles south of the Oregon line of Josephine county, and 24 miles from Jacksonville, Oregon, the nearest supply point. The ledge is reported to be from 300 to 350 feet in width. The location is upon a tributary of Elliott creek, extending southward from the Oregon boundary. A branch railroad will be needed in the operation of the mine.

#### TRINITY COUNTY.

Mrs. A. L. Dean of Redding and T. Morton have given a working bond on their placer mine near Trinity Center to W. C. Werick for one year at \$4000.

The lower works of the Altoona cinnabar mine at Altoona are all being gutted out, the machinery pulled up and the bunches of ore left in the upper levels are now about all worked out. It is reported that the property will close down. The company is arranging to buy from J. Conant the ledge of gold ore on Scott mountain for \$20,000. The company is also bargaining for another large claim in the same section belonging to J. M. Waller. The machinery from the Altoona mine will be moved to Scott mountain if they buy, and a milling and cyaniding plant will be erected. J. Porter is Supt.

The Yellow Rose of Texas, at Carrville, owned by G. L. Carr & Co., is producing a gold brick every month from the milling plant on the mine. Mr. Carr states that a 1000-foot tunnel will be started to cut the ledge down about 520 feet from the surface, and, if the ledges struck, another mill will be added. Ten men, under Foreman J. C. Boddiker, are employed.

#### TUOLUMNE COUNTY.

Bacon Bros. have bonded for two years the Wild Cat mine near Sonora. T. Munk is superintendent.

The lower shaft, 250 feet deep, of the old Soulsby mine, at Soulsbyville, is being unwatershed preparatory to active work. The machinery is being repaired.

The Tuolumne River M. & P. Co. has been incorporated with a capital of \$200,000 and office at Los Angeles. The directors are L. M. Gregory, R. B. Dickinson, E. B. Landt, H. V. Carter and S. V. Landt. The company has bought the Phillips mine, near Sonora.

At the Eagle-Shawmut mine 250 men are employed. The machinery of the hoist has been set up. An incline tramway is being built from No. 2 shaft to the 100-stamp mill, now under construction.

#### YUBA COUNTY.

The owners of the Miller mine, near Forbestown, will erect this fall a 20-stamp quartz mill which they have obtained from the owners of the Banner property.

### COLORADO.

#### CHAFFEE COUNTY.

Minneapolis parties, with G. Falconer as manager, have taken a three years' bond on the Old Troy mine, near Granite. A large body of concentrating ore has been opened up and a new mill installed, which has since been increased to twenty tons daily capacity.

#### CLEAR CREEK COUNTY.

R. M. Stearns of Syracuse, N. Y., secretary and treasurer of the General Hooker M. Co., states that work will be started on the 800-foot tunnel to cut the Pickwick vein on Saxon mountain, Georgetown. J. Carroza will be foreman at the mine.

H. L. Tournay, representing Philadelphia people, is getting the Jack Rabbit mine in shape to resume operations. The Little Superior G. M. Co. has bought the mine and will begin sinking and drifting.

#### DOLORES COUNTY.

(Special Correspondence).—The Pro Patria M. & M. Co. owns a group of properties on the northwestern portion of Enterprise hill, at Rico, which is being developed under the management of W. J. Scoutt. A crosscut tunnel has been driven 2370 feet, which cuts twelve of the Enterprise system of veins that stand vertically and trend from northeast to southwest. One of the principal of these veins is the Jumbo Third, which this tunnel cuts 2356 feet from the entrance and 1100 feet below the surface. Drifting on this vein is now in progress. This same vein on the Enterprise group has been opened about 4000 feet. About 310 feet above the

Pro Patria tunnel level is what is known as the Enterprise contact. The ore from the Jumbo lead consists of a lead, iron and zinc sulphide, the values in their order being silver, lead, gold and zinc. The lead runs 15% to 30% and the zinc about as high. Mr. Scoutt estimates the ore to run from \$22 to \$30 per ton. A Leschen tramway is being erected from the tunnel, down through the town, to a point near the railroad, where a concentrating mill is being erected. The tram line will be 3800 feet long, built on a 15% grade. The mill will be equipped with crushers, rolls, screens, jigs, grinders and tables. The principal lead values will be saved as a jig product. The iron and zinc tailings from the jigs will be reground and roasted to magnetize the iron; then the iron and zinc in this roasted product will be parted by a magnetic separator. The jigs will be of a type made in Joplin, Mo. The mill will be driven by a Hug water wheel and will approximate 100 tons capacity per day.

Lacy & Dewey have a lease on the old concentrator at Rico and are running it as a custom mill. It has crushers, jigs and tables and makes lead, iron and zinc products.

The Rico M. & M. Co. are developing and operating the Atlantic Cable group, which includes ground on both sides of the Dolores river at Rico. The property also includes an ore-dressing and separating mill, which the company is operating with electric power. Most of the mine work is through a 460-foot tunnel, running easterly from the mill level, disclosing considerable of a deposit, apparently in blanket form, of a body of iron, zinc and lead ore, ranging from 8 to 10 feet thick and possibly 75 feet wide. The mill makes a zinc product that carries less than 1% lead and less than 4% iron. The lead product is also very clean. The equipment comprises twenty stamps, six Wilfley tables, a roaster and Dr. Campbell's magnetic separator. The heavier material from the stamps passes to two tables, the lighter going to a third table through hydraulic settlers. The tailings from these three tables are reconcentrated over three similar tables. The result of this table work is a pretty clean lead product and another product carrying the zinc and iron in uniform mass. The latter passes to the roaster, by which the iron is changed to magnetic, the separator making partition of the iron from the zinc. The mill will handle fifty tons of ore per day. L. D. Mather is manager of the Rico M. & M. Co., with E. B. Green in charge of the mill.

D. Swiekhimer is continuing development work on Telescope mountain, having recently shipped seven carloads of lead carbonate ore. He also continues his development on the opposite side of the gulch.

Rico, Aug. 29.

#### GUNNISON COUNTY.

The Matchless mine, near Tin Cup, is showing a 6-foot vein with ore which runs from 50 to 150 ounces in silver and 20% to 30% lead. H. Smith of Tin Cup and J. Brough & Co. of Boulder are operating this mine.

The Detroit M. Co., I. L. Johnson manager, has taken the Tin Cup mine on Gold hill, Tin Cup, and is doing development work. In a crosscut on the vein 4 feet of good ore is showing which goes as high as 50% lead. This mine has not been worked since 1893 until now.

#### PITKIN COUNTY.

F. Osborn, manager for a company of Twin Lakes people, has commenced development work on its mines near Aspen.

#### SAN JUAN COUNTY.

(Special Correspondence).—The North Star mine, on King Solomon mountain, has been acquired by the Contention M. Co., whose stockholders are practically the same as those of the Smuggler-Union M. Co. at Telluride. The North Star is an old property, which was extensively and profitably worked for years. In its best days it produced some very high-grade silver-lead ore. It is opened by a system of tunnels and levels, which cut into the mountain at various points from near the apex down the mountain sides several thousand feet. The highest level is about 13,500 feet altitude, and there is considerable open-cut work at a point on the summit nearly 14,000 feet above sea level. This mountain and its mine are accessible on three sides—from Silver Lake basin on the south, Cunningham gulch on the east, and Giant basin on the north; The new company, under the management of G. E. Collins, has commenced erecting an aerial tramway from the fifth level entrance, above Giant basin, to the Animas river, a distance of nearly 13,000 feet. The difference in altitude of the upper and lower terminals will be about 3500 feet. The work of erecting a 100-ton mill at the Animas fork has also been commenced. Much new work has been laid out in the way of opening the



old mine's ore bodies at lower levels. The ores vary a great deal. They include galena, gray, yellow and pyritic copper, the highest silver values being in company with the gray copper. In other portions, where the latest work has been done, there is found an increase of the gold values in black pyritic quartz.

R. C. Tooke has control of the Valley Forge group, on the southern slope of Tower mountain, which includes six claims. Within the present season seven carloads of ore have been shipped, which showed a lead-copper base, carrying about one-half ounce gold and twelve ounces silver to the ton. This production has been incidental to the development in progress.

The Kendrick-Gelder smelter is operating on about 125 tons of ore per twenty-four hours, producing about a 50% copper matte, containing values in gold and silver. The copper value stands first, the gold second and silver third. This plant does not buy any of the lead ores of the district, confining its work to the copper-iron ores, which carry a fair valuation in gold and silver. The ores they get from the Henrietta, for instance, contain about 20% iron, much of other ores bought running about 10% iron. These ores generally run from 20% to 70% silica and 20% aluminum—that, is they make a slag that carries that much alumina.

The Four Metals is near the head of Bear creek that forms one of the headwaters of the Rio Grande. Development consists of a 350-foot tunnel on the strike of the vein. The ore is a calaverite, running high in gold. A number of tons were packed to Silverton for shipment.

The Gold Bug, in same locality, recently produced nine sacks of ore that sold for \$4900. Work on the group amounts to 800 or 900 feet. Mike Coghlan is manager.

The Good Hope, owned by Denver men, has been considerably opened up, but is not working now.

The Kaukaakee, comprising three claims, is developed by 175 feet of work. It belongs to Joe Frank, Frankenburg, Nance and others. The Bonita also has some development. All these Bear creek properties are at an altitude of about 12,700 feet.

Silverton, Aug. 23.

#### SAN MIGUEL COUNTY.

The Gold Run Extraction Co., owning large acreage of placer and tailing dump ground below Pandora, are operating their cyanide plant on impounded tailings which came from the mills above. They are running about 200 tons daily, recovering about equal values in gold and silver. They make a cleanup every fifteen days. The property belongs chiefly to Stephen Peck.

(Special Correspondence).—The Liberty Bell mill at Telluride is treating 220 tons of ore daily with sixty stamps; and Supt. Chase expects soon to be operating eighty stamps on 300 tons per day. This mill involves stamps, plates, concentration and cyanide work and was fully described in this paper in September, 1900. The principal saving is on the plates, the cyanide work coming second and concentration third. At the mine the plant has been doubled this season.

S. T. Elliott & Co. are operating a 15-stamp mill on the old Sheridan dump in Marshall basin. They have shipped six cars of concentrates.

The Special Sessions is on the Elk creek side and the Silver Pick mine on the Bear creek side of a spur from Mt. Wilson descending toward the San Miguel river. The mineral belt, on which both groups are located, has a northeast and southwest trend, carrying an iron, copper and arsenical sulphide ore, with large streaks of quartz carrying free gold. Special Sessions, which is managed by E. L. Davis, is opened through two tunnels, which are connected. From the lower tunnel level an upraise goes in ore 150 feet to the surface. Drifting on the vein aggregates 1200 feet. Smelter certificates of shipment returns show the ore to carry 36% to 40% silica, 16% to 20% iron, 3% to 4% copper, and an average of about seven ounces silver and 2.93 ounces gold to the ton. It is an ore well suited to amalgamation and concentration. The Sessions comprises six lode claims and 160 acres of placer ground on Elk creek, where there is heavy timber. The lode claims are at an altitude of about 12,000 feet. The Silver Pick, on the opposite side of the spur, is higher. The latter property has not been operated this year.

Telluride, Aug. 30.

The Telluride Power Co. is driving a 3000-foot tunnel through a spur of Sheep mountain by electric drills to tap Lake Hope and convey its water into a tributary of Trout lake.

#### TELLER COUNTY.

The Zenobia G. M. Co. has started the largest shaft in the Cripple Creek district. It is to be 6x16 feet clear and will be sunk to the 300-foot point rapidly.

The first practical demonstration of the

use of fuel oil in the Cripple Creek district is to be made by the Stratton's Independence Co. Recently another battery of boilers was installed, and it has been decided to use oil in them for steam purposes. It is claimed that a saving of from 25% to 30% over the cost of coal will result.

The Gold Bond Co. at Cripple Creek has given a two years' lease on the main workings of the mine to G. Bent.

The Nabob Co. have installed a steam plant on the Seven-Thirty claim, on Bull hill, Cripple Creek.

The Isabella mine, Cripple Creek, it is said will be soon sold to the Venture Co. of London.

The gold output of the Cripple Creek district for August in round numbers amounts to \$2,700,000, as compared to \$2,100,000 for July. This is the largest output ever made in the Cripple Creek district during a single month. The railroads have found difficulty in furnishing cars for the transportation of gold ore and miners have been hard to procure. With no interruption September will undoubtedly make a record of \$3,000,000, as every mine in the district is outputting strong.

An important development has been made in the Elkton mine at Cripple Creek, which is expected to determine the plans of the management to erect a mill on the ground, namely the opening of very large bodies of \$20 to \$40 ore in the Raven dike in the fifth level of the mine. The opening of the dike reveals a quantity of low-grade ore in addition to that which will run as high as two ounces; and there are already opened up in the mine great reserves of ore which are of a grade too low to treat at distant mills. In addition, it is estimated that the dump contains at least 200,000 tons of \$10 ore. The management has decided to hold it against the time when it can be handled on company account in its own mill.

#### IDAHO.

##### IDAHO COUNTY.

H. H. Bole of Lewiston has sold a half interest in the Orion mine, near Pierce City, to the Ohio & Idaho M. & Dev. Co., composed of Cleveland, O., people, for \$10,000. Other owners in the property are F. J. Boston, J. A. Gill, R. A. Langford and P. E. Stockey. The property has been developed considerably and a large body of ore been exposed, carrying high values in free gold and silver. A shaft will be sunk to a depth of 200 feet.

##### BOISE COUNTY.

Operations are to be resumed at the Lucky Boy gold mine near Idaho City. It is probable a new shaft will be sunk and new ground explored. The mine has a 20-stamp mill.

##### MONTANA.

##### FLEATHAM COUNTY.

At the B. & B. mill, West Fisher, Supt. Blackwell, the ground is being sluiced away for an addition to the mill of ten stamps.

##### GALLATIN COUNTY.

McCoy, Kirk & Kline will erect a mill to treat the output of their corundum mines near Bozeman.

Walker & Badgley, who are developing a copper mine near Springhill, have run a tunnel 190 feet, disclosing a vein about 20 feet wide.

##### LEWIS AND CLARKE COUNTY.

A cyanide plant is being built by Madden & Sullivan upon the Sunrise mine, near Winston. It will consist of rolls, amalgamating tables and cyanide tanks. The Sunrise is the oldest property in the Winston district, having been worked first in the '70s by Small & Rogers, who still own it. It is developed by one 400-foot tunnel and several shorter tunnels.

##### MADISON COUNTY.

E. H. Wilson and associates of Butte have bonded the Coal Creek placer, near Red Bluff, of 160 acres, owned by A. W. Tanner, and are preparing for next season's hydraulic mining. It contains gold, garnets and corundum, the quantity of the latter being between thirty and forty pounds to the cubic yard of gravel.

Moffett Bros. are in 200 feet on their tunnel on the Quincy mine, near Sheridan, and expect to strike a large body of copper ore.

##### SILVER BOW COUNTY.

In the report of General Manager Klepetko of the Boston & Montana Co. at Butte, for 1900, made to the Board of Directors of the company, he says: "Regardless of the fact that extraction this year has been the largest in the history of the mines, the ore reserves have been increased by 200,000 tons, and aggregated 2,700,000 tons on January 1, 1901. Having the requisite capacity to treat low-grade ores, and the price of copper being at a point to allow the mining of these low-grade ores profitably, it is the intention to make our product, as far as possible, from

these lower grade ores, reserving the higher grade ores for future mining and treatment, when the price of copper may not be so favorable." The report of the directors shows that during last year the total receipts of the company were \$13,242,576.64, all from the output of copper, silver, gold and bluestone. The net income aggregated \$8,161,383.99 and the total expenses \$5,049,724.46. Among these expenses were those at Great Falls and Butte, including the electrolytic refining, \$4,241,895.84, and handling copper, such as freight, copper charges and commissions, \$807,828.62.

#### NEVADA.

##### HUMBOLDT COUNTY.

J. Taylor of Mill City has shipped a carload of 80% antimony ore to New York. The mine is situated in Bloody canyon, about 14 miles from Mill City.

##### WHITE PINE COUNTY.

The Saxton mine of the McKinley property at Ely is being developed and a large area is being stripped. It is the intention of Manager W. N. McGill to sink a shaft, going down to a depth of 200 feet or more before beginning to drift.

#### NEW MEXICO.

##### GRANT COUNTY.

The International M. & Dev. Co. has been incorporated by O. A. Phelps, H. E. N. Phelps, C. F. Dunn, L. A. Milliken, W. Watson, L. B. Robinson and D. C. Harrington, who are also the directors. The office of the company is at Silver City, and capital is \$1,500,000.

The Phelps-Dodge Co., who have a bond on the Beaver-Bolton properties at Fierro, have their new double compartment shaft down 80 feet.

T. W. Carter has bought from N. C. Rascom the Copper Gulf claim at Burros.

M. Hughes, contractor on the Dawson lease on the Anson S mine at Fierro, has struck a body of ore which he estimates will go 12% in copper. A carload shipment has been made to the smelter.

#### OREGON.

##### BAKER COUNTY.

A. J. Tadlock has struck a ledge of free gold ore on his two claims near Sumpter. Assays of surface rock show \$40 to the ton. It is reported that the property will be bonded at \$85,000 to Pennsylvania people.

A rich strike of free gold ore has been made in the Collateral ledge of the old Virtue mine at Baker City on the 400-foot level. It is said that the find is a very large one, and ten stamps of the mill are crushing the new ore.

The California Mountain Con. M. Co. is building a concentrating plant addition to its stamp mill. There are fifty men employed by the company.

##### JACKSON COUNTY.

G. Cottrell, who discovered what was supposed to be a ledge of coal in Section 4, Township 38 S., Range 2 E., three years ago, is doing development work, associated with H. W. Jackson and C. W. Baker of Ashland, and the discovery now proves to be asphaltum, the outcroppings of which have become hard and brittle by oxidation. This deposit is about 400 feet long, 60 feet wide, and dips east between beds of sandstone and shale.

#### SOUTH DAKOTA.

##### CLARK COUNTY.

Deadwood people have organized the Edna Exploration Co., capital \$50,000, to develop the old South Dakota Co. ground, near Garden City. There is considerable cyaniding ore blocked out at the present time. S. Burns of Garden City is manager of the company.

##### PENNINGTON COUNTY.

J. K. Vanatta, the president of the Spearfish M. Co., states that new rolls and screens have been put in the mill and the higher extraction of gold by finer crushing and sizing has already paid for the additional machinery. The track has been laid from the mine to the plant.

The Gertie M. & M. Co., capital \$1,000,000, has been organized by E. C. Johnson of Hill City and others to work 157 acres of ground at Hill City containing a ledge of tin ore, which it is claimed averages about 3½% tin. This tin ledge is 5 feet thick and it has been sunk upon over 400 feet, with levels every 100 feet. Parallelizing this tin ledge is a 5-foot ledge of free milling ore which runs about \$9 per ton gold. The company proposes to erect a mill this fall. A steam hoisting plant will be put on the mine at once. E. C. Johnson is secretary and general manager at Hill City.

The Lacota G. M. & R. Co., in which W. E. Burchinell of Denver is a large stockholder, has opened a 12-foot vein of ore 70 feet below the surface in a shaft on the Grizzly Bear, near Hill City. Four feet of the ore is free milling and assays

\$8.50 gold to the ton. There are sixteen claims in the group now owned by the new company.

#### UTAH.

##### IRON COUNTY.

The Sunnyside M. Co. at Stateline will erect a leaching mill to work the gold and silver ore.

The Johnny M. Co. of Stateline is said to be arranging for the enlargement of its mill.

##### SUMMIT COUNTY.

A test run has been made at the Silver King sampler at Park City by Foreman Fleming. Mr. Fleming took 165 tons of ore and after calling out all the employees went into the mill with one assistant, and in just three hours and thirty-seven minutes from the feed gate the 165-ton lot had been run through and sample delivered to the assay office. No one was in the mill except Mr. Fleming and Mr. Steele, and no other assistant was called in to do the work. The Silver King is also making an addition to its mill by a building 84 feet by 48 feet to carry the rotary drier, filter presses, air compressors, air receivers, tanks, etc.

##### WASATCH COUNTY.

The Pearl S. M. Co. has been incorporated, with office at Heber, to operate the Pearl J. C. and Rosebud claims. The incorporators are Hatch Bros., W. Waldon and Mrs. Waldon, W. Harwood and W. Horner. J. Hatch is president and superintendent.

#### WASHINGTON.

##### FERRY COUNTY.

The owners of the Washington mines, located near Hall's bridge, Marcus P. O., propose to run their tunnel 100 feet farther. The Washington is owned principally by F. Ward and C. Brooks of Marcus.

Bedier & Hoefstetter, lessees of the El Caliph mine at Republic, have received \$1336.27 net from 23,670 pounds of ore sent to the smelter. The gross values per ton were \$126.58. The firm is taking out between \$700 and \$800 worth of ore per week with five men employed.

#### WYOMING.

##### CARBON COUNTY.

E. W. Hull of Cripple creek has the contract for hauling 100 tons of ore from the Rambler mine to the Encampment smelter. The smelter will start its furnaces about September 1. A traction engine will be used to haul twenty tons of matte to the railroad and ten tons of coke to the smelter on the return trip.

P. Lee has bought the interest of C. A. Finley in the Finley property near Encampment. The mine has a 170-foot shaft and considerable drifting. A hoisting plant will be put on at once. The Finley is said to have a 12-foot vein, with an average of 8% copper.

It is reported that the Doane or Old Rambler copper mine at Battle Lake has been sold by the Battle Lake Tunnel Site Co. to Chicago people. It is understood that the price was \$2,000,000, a portion of which was paid in cash and the balance in stock in a new company which has been formed to work the mine.

#### FOREIGN.

##### BRITISH COLUMBIA.

G. Aylard of New Denver and N. Gething of Slocan have bought the Gold Viking group, near Slocan, which has been under bond to T. S. Dunbar, representing Portland, Or., men, who form the Viking Dev. Syn. The deal was closed by the payment of \$7500 cash, and the allotment of 15% of the stock in the company to be formed to develop the property. The Viking is a gold property and the ore, while not free milling, is said to be worked on the ground. The work done on the property has shown a quartz ledge to be 20 feet wide.

Stone & Knight of Spokane, Wash., have taken a contract to start work on the Payne mine in the Slocan. Two diamond drills will be put on to prospect the ledge.

This week the Sunset mine, Deadwood camp, has sent out a shipment of 250 tons of ore to the Hall mines smelter at Nelson. A 10-car spur is being put in at the mine, and other preparations for regular shipments are being made.

#### MEXICO.

The Sonora M. & M. Co., C. O'Keefe president, is operating mines situated in the district of Altar, municipality of Tututama, State of Sonora, about 50 miles northwest of the Sonora Railroad. La Fortuna is the principal claim in the group of eight, all gold and silver-bearing. The silver ore will be treated by the hypophosphite process, under H. G. Glorie, chemist, who will superintend the erection of the plant.



Personal.

THERE are three letters at this office for "Rex."

F. WOOD of San Francisco is sojourning at Juneau, Alaska.

W. P. O'MEARA of Salt Lake City, Utah, is in Tonopah, Nev.

J. T. FINLIN of Butte, Mont., is examining copper mines at Milford, Utah.

A. C. GARDE, manager of the Payne mine, Slocan, B. C., is in Montreal, Canada.

C. H. HENRY has resigned as Supt. of the Bluestone copper mine, near Yerrington, Nev.

E. S. BRADOCK, manager Wilbur-Womble mine, near Hodson, Cal., is in New York.

C. R. DOWNS, C. E., of Sutter Creek, Cal., was in San Francisco for a few days this week.

J. RINLEY of Park City, Utah, has returned to that place from Dawson, in the Yukon country.

W. H. W. HAMILTON is manager of the Owl & Elephant mine, near Sumpter, Baker county, Or.

C. H. MCCLURE has been appointed Supt. of the Last Chance mine in Cocino county, Arizona.

W. J. BALFREY has been appointed superintendent of the Summerville Hy. mine at Cecilville, Cal.

W. F. SNYDER has returned to Salt Lake City, Utah, from an examination of some California mines.

examine some lately discovered gold deposits.

D. H. JACKSON and his son Clyde have returned to California from a prosperous sojourn in Nome, Alaska.

A. J. McMILLAN, managing director of the Snowshoe gold and copper mine at Phoenix, B. C., has returned to that place after several months' absence in London.

W. F. ALDRICH, former secretary of the Parke & Lacy Co., latterly acting consul general U. S. at Hongkong, is associated with the Globe Engineering Co., San Francisco.

Recently Declared Mining Dividends.

|                                                                           | Payable. |
|---------------------------------------------------------------------------|----------|
| Bunker Hill & Sullivan M. & C. Co., Idaho, monthly, \$21,000              | Sept. 3  |
| Bald Butte G. M. Co., Montana, monthly, 6 cents per share, \$15,000       | Sept. 10 |
| La Fortuna G. M. Co., Arizona, monthly, 5 cents per share, \$12,500       | Sept. 9  |
| Mammoth M. Co., Utah, monthly, 5 cents per share, \$20,000                | Sept. 10 |
| Modoc G. M. Co., Colorado, 3 cents per share, \$15,000                    | Sept. 15 |
| Rocco-Homestake G. M. Co., Nevada, monthly, 1 1/2 cents per share, \$4500 | Sept. 10 |
| Silver King M. Co., Utah, monthly, 6 1/2 cents per share, \$100,000       | Sept. 10 |
| Swansea S. M. Co., Utah, monthly, 5 cents per share, \$5000               | Sept. 10 |

Commercial Paragraphs.

THE Potosi Mining Co. of Chihuahua, Mexico, have placed an order with the Denver, Colo., office of the Allis-Chalmers Co. for a 24"x48" first-motion, double-cone drum hoist. The brakes, reverse gear and friction clutches will all be operated by auxiliary air cylinders.

THE S. Morgan Smith Co. of York, Pa., have lately supplied the Floriston Pulp & Paper Co., Floriston, Cal., with horizontal shaft McCormick turbines operating under 50 feet head, developing 4700 H. P., which are used for driving machinery in its pulp and paper mill. Also, the Walls Walla Gas & Electric Co. a single 27" McCormick turbine, which operates an electric plant under 90 feet head; the Boston & Montana Con. Copper & Silver M.

Co., Great Falls, Mont., a pair of horizontal shaft 54" McCormick turbines, developing 2800 H. P.; the Washington Water Power Co., Spokane, Wash., two pairs of McCormick turbines in iron cases on horizontal shafts, each pair developing 1800 H. P. under 68 feet head; Oregon City Mfg. Co., Oregon City, Or., pair of 36" in iron case on horizontal shaft; Willamette Pulp & Paper Co., Oregon City, Or., a pair of 36" mounted in a similar manner; Crown Paper Co., Oregon City, Or., six horizontal shaft McCormick turbines in iron cases; the Missouri River Power Co., Helena, Mont., seven sets of horizontal shaft McCormick turbines of 7000 H. P. capacity.

Catalogues Received.

H. Williams & Co. of 9 to 31 Richards St., Brooklyn, N. Y., have issued a catalogue and price list of their specialties in the metal manufacturing line. It contains descriptions and cuts of drop forgings made of iron, steel, copper, bronze and aluminum, little things all of machines, but many of them important parts of big things in machines.

The Colorado Iron Works Co. have issued from their offices at Denver, Colo., two attractive catalogues, "Stamp Milling Machinery Catalogue, No. 6," and "Some Details as to Smelting Practice and Equipments." Both publications give, in addition to descriptions of the appliances, much useful practical information relative to their use.

The Jeffrey Manufacturing Co. of Columbus, Ohio, has sent out a handsomely illustrated catalogue of the many types of electric locomotives manufactured by them for special mining use. In addition to the more or less familiar mine locomotive taking power by a trolley, there is a storage battery mine locomotive illustrated that is somewhat of a novelty.

The Denver Engineering Works Co., Shepard & Searing, of Denver, Colo., have issued a number of bulletins, each dealing with a special machine or mechanical operation for which it offers the choice of several machines. The bulletins deal with electric hoists, the improved Cammett concentrator, sample grinder, mine timber framing machine, standard crushing rolls and standard re-crushing rolls. In each is given the results of experimental tests and other pertinent information.

New Patents.

DEWEY, STRONG & CO.'S SCIENTIFIC PRESS PATENT AGENCY, 330 Market St., S. F., has official reports of the following U. S. patents issued to Pacific coast inventors:

FOR WEEK ENDING AUGUST 27, 1901.

681,383.—PISTON PACKING—W. H. Alison, S. F.

681,430.—HOIST—T. J. Barbour, S. F.

681,397.—LAND ROLLER—F. A. Bruckman, Plainview, Or.

681,432.—GUN—H. Carr, S. F.

681,612.—SCISSORS, ETC.—S. Clegler, S. F.

681,668.—SPRAYING TREES—J. M. Clark, Lompoc.

681,441.—ENGINE EXHAUST—W. L. Corson, S. F.

681,407.—OBTAINING SALT—P. H. Coward, S. F.

681,496.—CART—W. A. Cowley, Benicia, Cal.

681,458.—TELEPHONE RECEIVER—Cox & Reed, Portland, Or.

681,332.—FRUIT GATHERER—C. J. Eddy, Seattle, Wash.

681,300.—PIANO PEDAL—J. A. Ellwell, Seattle.

681,392.—PISTOL HOLDER—L. E. Fugate, Seattle.

681,501.—TIRE SETTER—O. Gamas, Wallace, Cal.

681,325.—HANDLE BAR—J. Hult, Hood River, Or.

681,594.—ROCK DRILL—C. Hultquist, Jerome, Ariz.

681,433.—PIPE COUPLING—H. L. Jordan, Santa Paula, Cal.

681,332.—MUSIC LEAF TURNER—W. V. Morrow, Los Angeles, Cal.

681,576.—MOTOR CARRIAGE—A. S. Parsons, Berkeley, Cal.

681,458.—MATCHER HEAD—W. W. Philbrook, Seattle, Wash.

681,433.—MATCHER HEAD—W. W. Philbrook, Seattle, Wash.

681,581.—ROTARY PUMP—J. Richards, S. F.

681,354.—FURNACE—S. M. Trapp, Seattle, Wash.

681,594.—AGRICULTURAL MACHINE—D. K. Uall, St. Johns, Ariz.

681,362.—VENEER MACHINE—W. W. Wood, Tacoma.

39,990.—DESIGN—W. R. Smith, Napa, Cal.

Notices of Recent Patents.

Among the patents recently obtained through Dewey, Strong & Co.'s SCIENTIFIC PRESS U. S. and Foreign Patent Agency, the following are worthy of special mention:

PHOTOGRAPHIC MOUNT.—No. 680,947. Aug. 20, 1901. P. J. Stuparich, San Francisco, Cal. This invention relates to improvements in the manufacture of photographic card mounts and similar cards in which the surface of the card is tinted. It consists in a method of indenting letters or characters in the plain surface of the card and the tint afterwards applied upon said surface, leaving the sunken characters indented and untouched by the tint.

ROAD CARTS.—No. 681,496. Aug. 27, 1901. Wm. A. Cowley, Benicia, Cal., assignor to Baker & Hamilton, San Francisco, Cal. This invention relates to improvements in the construction of road carts and particularly as to the manner of suspending the body so as to obviate the so-called "horse motion," so disagreeably noticeable in most vehicles of this type. It consists, first, in attaching the shafts directly but pivotally to the axle, and, secondly, in connecting the front of the body by a torsional spring connection to the shaft.

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## Latest Market Reports.

SAN FRANCISCO, Sept. 5, 1901.

**SILVER.**—Per oz., Troy: London, 27d (standard ounce, 925 fine); New York, bar silver, 58½c (1000 fine); San Francisco, 58½c; Mexican dollars, 47½c San Francisco, 45½c New York.

**COPPER.**—New York: Lake, 1 to 3 casks, \$17.25; carload lots, \$17.00; Electrolytic, 1 to 3 casks, \$16.75; carload lots, \$16.50; Casting, 1 to 3 casks, \$16.60; carload lots, 16.50. San Francisco: 18. Mill copper plates, 20c; bars, 22½c. London: £66 11s 3d per ton.

**LEAD.**—New York, \$4.37½; Salt Lake City, \$4.00; St. Louis, \$4.40; San Francisco \$4.90, carload lots; 5½c 1000 to 4000 lbs.; pipe 6, sheet 6½, bar 5½c; pig, \$5.25. London, £11 17s 6d per ton—2.58 cents per lb.

**SPELTER.**—New York, \$4.20; St. Louis, \$3.75; London, £16 2s 6d per ton—3.58½ cts. per lb.; San Francisco, ton lots, 5½c; 100-lb lots, 6c.

**ANTIMONY.**—New York, Cookson's, 10c; Hallett's, 9c; San Francisco, 1000-lb. lots, 10c; 300 to 500 lbs., 11c; 100-lb. lots, 13c to 15c.

**IRON.**—Pittsburg, Bessemer pig, \$16.00; gray forge, \$14.00; San Francisco, bar, per lb., 2.65c in small quantities.

**STEEL.**—Bessemer billets, Pittsburg, \$24; open hearth billets, \$26.50; San Francisco, bar, 7c to 12c per lb.

**TIN.**—New York, pig, \$27.50; San Francisco, ton lots, 30c; 1000 lbs., 30½c; 500 lbs., 30½c; less, 31c; bar tin, 31c to 35c.

**QUICKSILVER.**—New York, \$51.00 large lots; London, £9 2s 6d; San Francisco, local, \$47.50 per flask of 76½ lbs.; Export, \$45.00.

**MAGNESIUM.**—New York, \$2.90 per lb.; San Francisco, \$3.75.

**ZINC.**—San Francisco, 5½c; slab, 5½c; bar, 7c; zinc dust, N. Y., 8c.

**BABBITT METAL.**—San Francisco, No. 1, 10c.

**SOLDER.**—Half-and-half, 100-lb. lots, 19c; San Francisco, Plumbers', 100-lb. lots, 15½c.

**PHOSPHORUS.**—F. o. b. New York 50¢@60¢ per lb.

**ASSAY LITHARGE.**—San Francisco, 10c per lb, small lots.

**BISMUTH.**—New York, 2½c, \$2.25 50-lb lots; San Francisco, \$2.50 to \$2.75 per lb.

**PLATINUM.**—San Francisco, crude, \$19 per oz.; New York, \$20.50 per Troy oz. **FERRO-MANGANESE.**—Pittsburg, 80%, domestic, \$58.50, large lots.

**TUNGSTEN.**—New York, 95c; San Francisco, \$1.15.

**FERRO-TUNGSTEN.**—New York, 37c, 32c; San Francisco, 65c (60%).

**NICKEL.**—New York, 50¢@60¢ per lb.

**ALUMINUM.**—New York, No. 1, 99% pure ingots, 35c; No. 2, 90%, 30c to 35c.

**POWDER.**—F. o. b. San Francisco: No. 1, 70% nitro-glycerine, per lb., in carload lots, 15½c; less than one ton, 17½c. No. 1\*, 60%, carload lots, 13½c; less than one ton, 15½c. No. 1\*\* 50%, carload lots, 11½c; less than one ton, 13½c. No. 2, 40%, carload lots, 10c; less than one ton, 12c. No. 2\* 35%, carload lots, 9½c; less than one ton, 11½c. No. 2\*\* 30% carload lots, 9c; less than one ton, 11c. Black blasting powder in carload lots, minimum car 725 kegs, \$1.50 per keg; less car lots, \$2 per keg.

**CAPS.**—3x, \$5.50 per 1000; 4x, \$6.50; 5x, \$8; Lion, \$9, in lots not less than 1000.

**FUSE.**—Triple tape, \$3.60 per 1000 feet; double tape, \$3.00; single tape, \$2.65; Hemp, \$2.10; Cement No. 2, \$3.00; Cement No. 1, \$2.65, in lots of 3000 feet and up.

**CANDLES.**—Granite 6s, 16 oz., 40s., 9½c per set; 14 oz., 40s., 8½c.

**OILS.**—Linseed, pure, boiled, bbl., 75c; cs., 80c; raw, bbl., 73c; cs., 78c. Deodorized Stove Gasoline, bulk, 14½c; do., cs., 20½c; 86° Gasoline, bulk, 20c; do., cs., 26c; 63° Naphtha or Benzine, deodorized, in bulk, per gal., 13½c; do., in cs., 19½c; Lard Oil, Extra Winter Strained, bbl., 75c; cs., 80c; No. 1 bbl., 50c; cs., 55c. Neatsfoot Oil, coopers' bbls., 60c; cs., 65c; No. 1 bbl., 50¢@52½c; cs., 55¢@57½c.

**COAL.**—San Francisco, coast, yard prices: Wellington, \$9; Seattle, \$7.00; Coos Bay, \$6.50; Southfield, \$9.00. Cargo lots, Eastern and foreign: Wallend, \$8.00; Brynabo, \$7.50; Pennsylvania, hd., \$14.00; Scotch, \$8; Cumberland, \$12; Cannel, \$9.50; Welsh Anthracite, \$12.00; Rock Springs, \$8.50; Colorado Anthracite, \$14.50. Coke, \$16 per ton in bulk; \$18 in sacks.

**CHEMICALS.**—Cyanide of potassium, 98%—99%, jobbing, 31¢@32½c per lb.; carloads, 20¢@30c; in 10-lb. tins, 40c; sulphuric acid, in carboys, 66% B, 2c per lb.; soda ash, \$1.90 per 100 lbs.; hyposulphite of soda, 24¢@30¢ per lb.; blue vitriol, 5½¢@6½c per lb.; borax, concentrated, 7¢@8c per lb.; chlorate of potash, 12¢@13c; roll sulphur, 6c; alum, \$1.90@2.00; flour sulphur, French, 2½¢@2½c; California refined, 1½¢@2c; nitric acid, in carboys, 8c per lb.; caustic soda, in drums, 3¢@4c per lb.; Cal. s. soda, bbls., \$1.00; sks, 95c per 100 lbs.; chloride of lime, spot, \$2.50@2.60; nitrate of potash, in kegs, 8c; caustic potash, 10c in 40-lb. tins.

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**EXPERIENCED MINING ENGINEER** 43 will leave for Philippines in November. Will accept commissions and present himself with credentials to reliable parties wishing his services. There, after November 1, 1901. Address Supt. M. & M. C. M. & S. Co. Anaconda, Montana.

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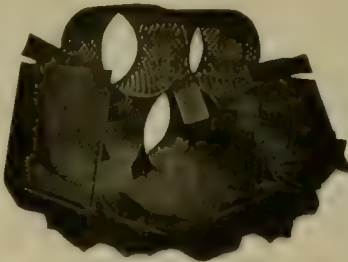
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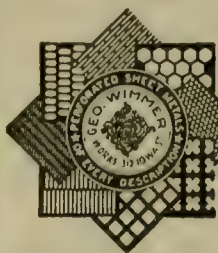


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**ASSESSMENT NOTICES.**

**YUBA CONSOLIDATED GOLD MINING COMPANY.**—Location of principal place of business, San Francisco, California; location of works, Nevada County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 19th day of August, 1901, an assessment (No. 3) of three cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, Room 801 Claus Spreckels Building, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 24th day of September, 1901, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 14th day of October, 1901, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.  
EDWARD H. STRAENS, Secretary.  
Office—Room 801 Claus Spreckels Building, San Francisco, California.

**OSCEOLA CONSOLIDATED MINING COMPANY.**—Location of principal place of business, San Francisco, California; location of works, Plymouth, Amador County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 28th day of August, 1901, an assessment (No. 12) of one (1) cent per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 307 Montgomery street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 5th day of October, 1901, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 28th day of October, 1901, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.  
HOLLAND SMITH, Secretary.  
Office—307 Montgomery street, San Francisco, California.

**ETNA PETROLEUM COMPANY.**—Principal place of business, San Francisco, California. Location of works, Fresno County, California.

Notice is hereby given, that at a meeting of the Directors, held on the 22nd day of August, 1901, an assessment of ten (10) dollars per share was levied upon the capital stock of the corporation, payable immediately to the secretary, at the office of the company, No. 316 California street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 24th day of September, 1901, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on the 14th day of October, 1901, to pay the delinquent assessment, together with costs of advertising and expenses of sale.

R. F. MACLEOD, Secretary.  
Office—No. 316 California street, San Francisco, California.

**THE CALIFORNIA DREDGING COMPANY.**—Principal place of business, 120 Sutter Street, San Francisco, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 8th day of August, 1901, an assessment of \$10 per share was levied upon the capital stock of the corporation, payable immediately in gold coin, to the secretary of the corporation, at the office of the company, Room 56, 120 Sutter Street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on TUESDAY, the 10th day of September, 1901, will be delinquent and advertised for sale at public auction; and unless payment is made before, will be sold on TUESDAY, the 1st day of October, 1901, to pay the delinquent assessment, together with the cost of advertising and expenses of sale.

(Signed) SAM. W. CHEYNEY, Secretary.  
120 Sutter Street, San Francisco, California.

**WILLIETTA MINING & MILLING COMPANY.**—Location of principal place of business, San Francisco, California; location of works, Tuolumne County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 18th day of August, 1901, an assessment (No. 2) of one (1) cent per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, Room 8, 206 Sansome street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 30th day of September, 1901, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 28th day of October, 1901, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

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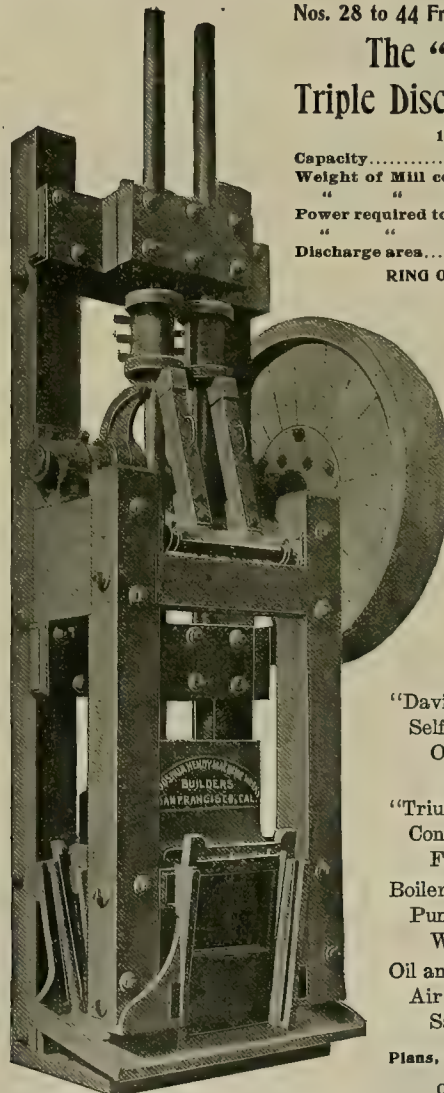
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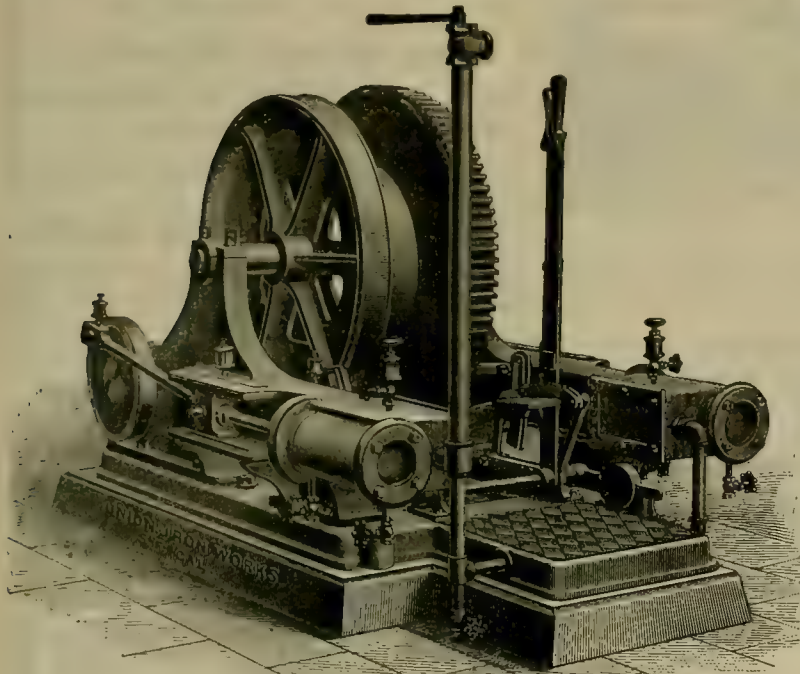
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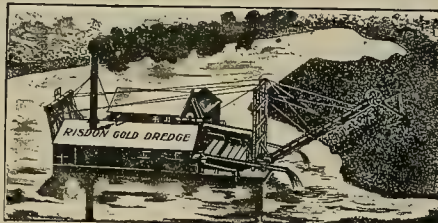
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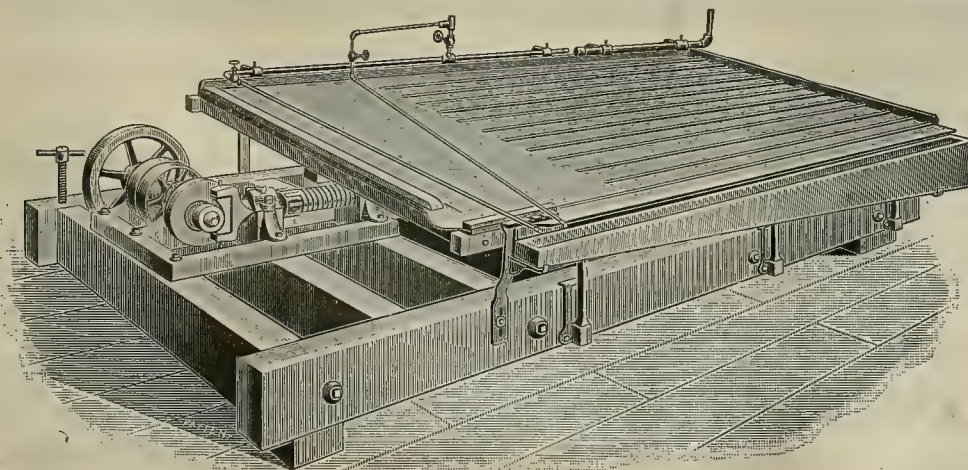
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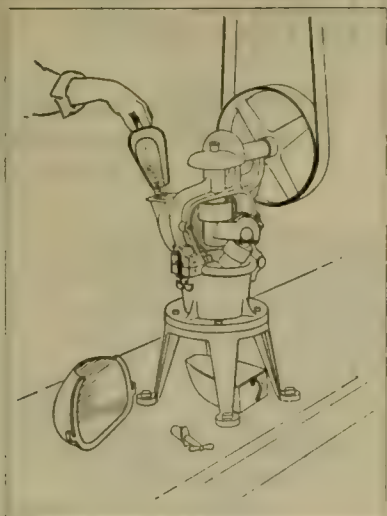
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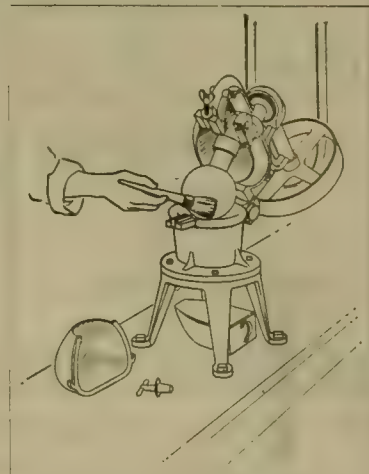
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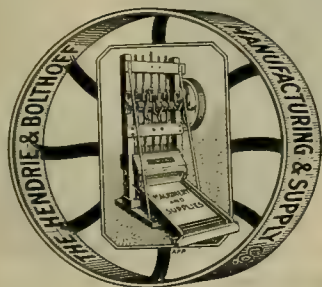
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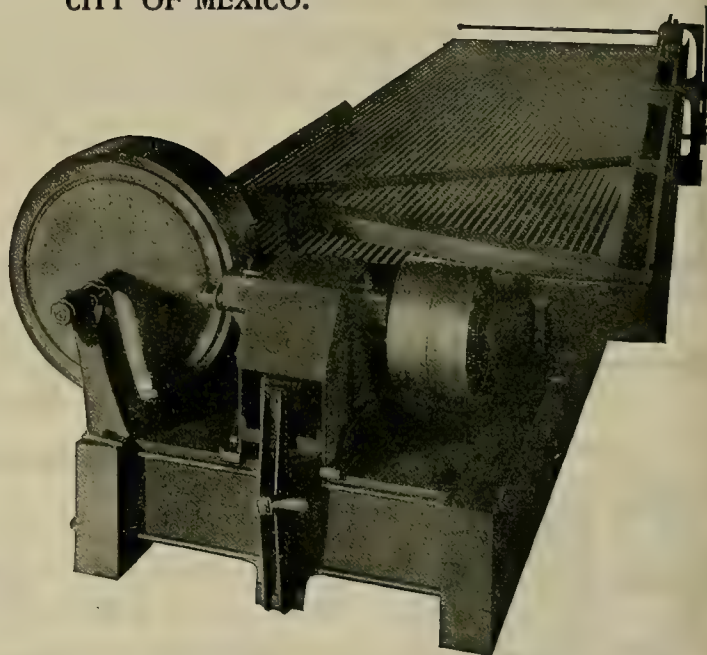
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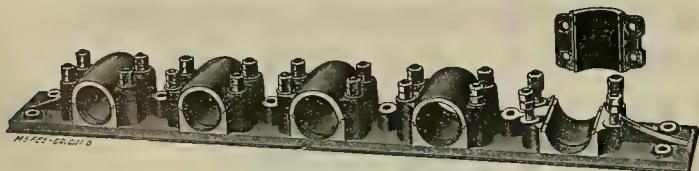
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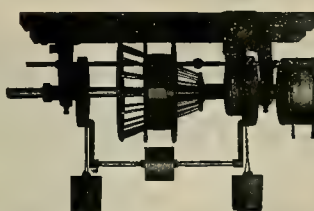
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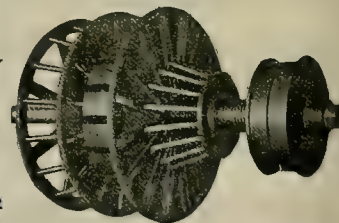
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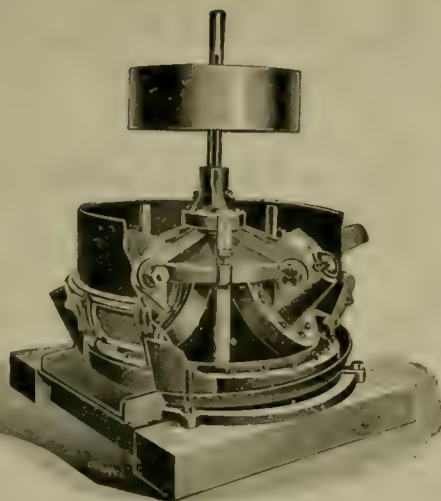
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ORE MILL.



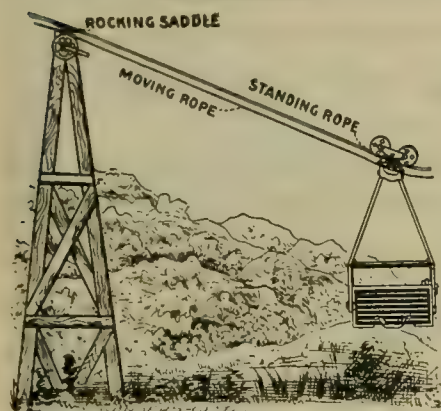
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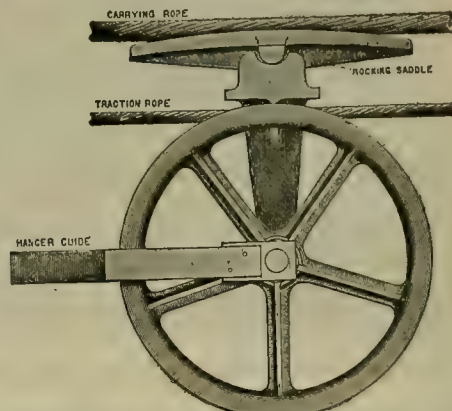
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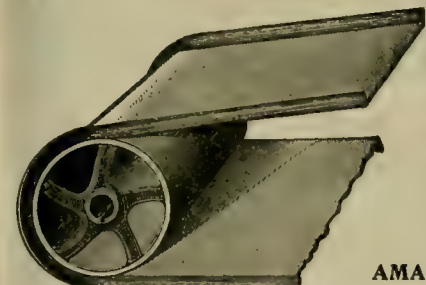
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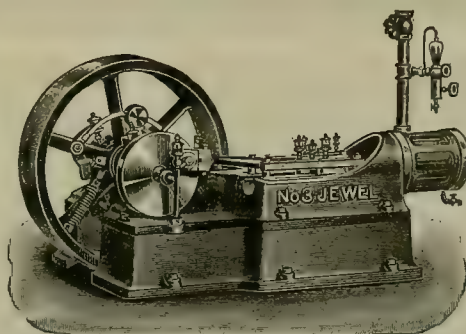
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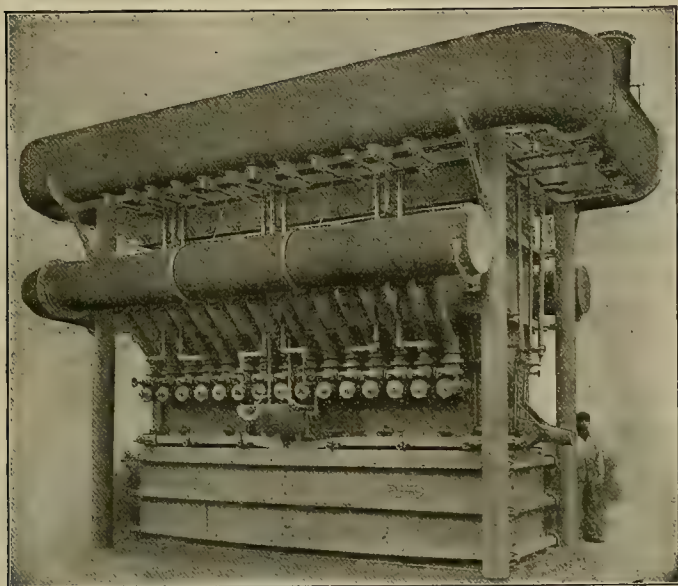
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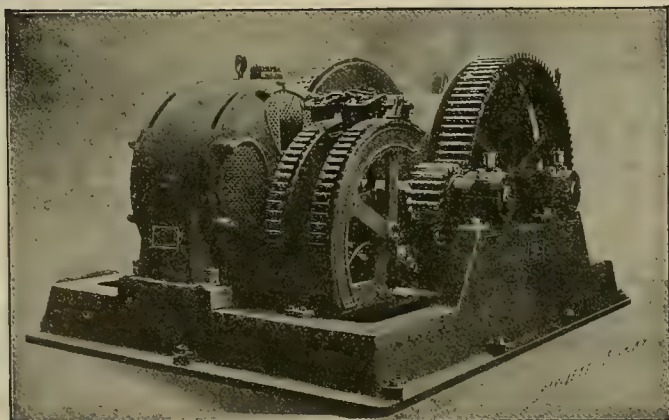
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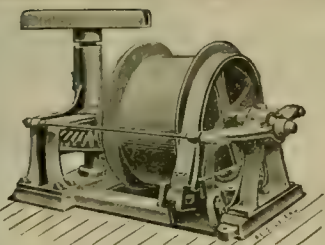


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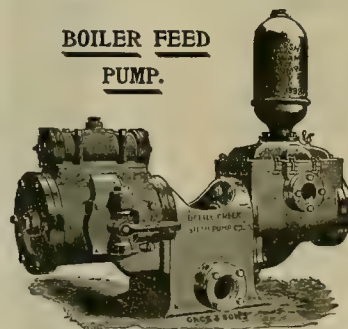


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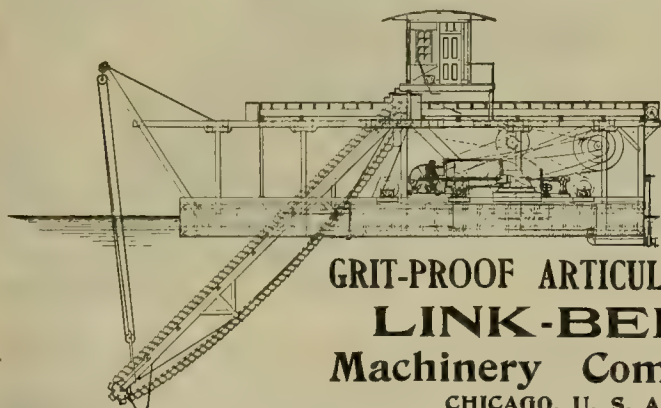
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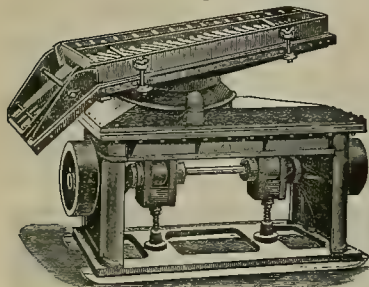
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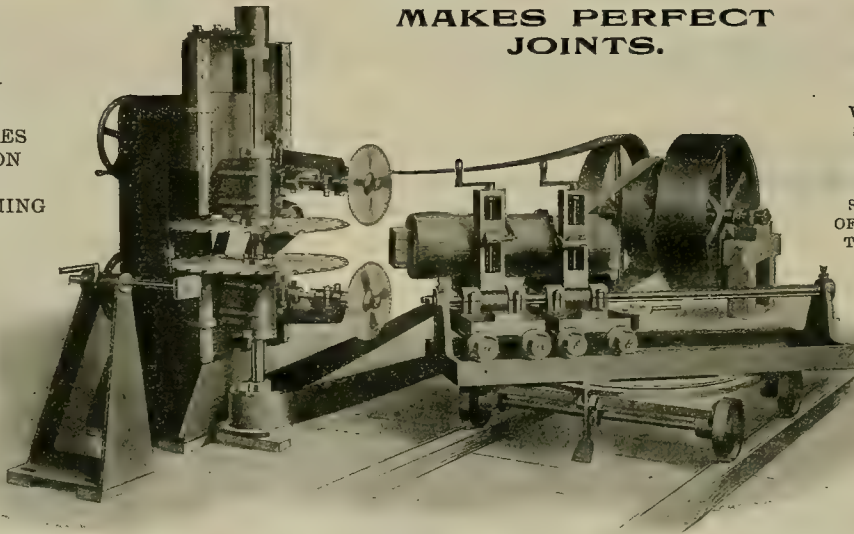
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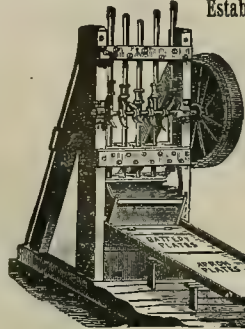
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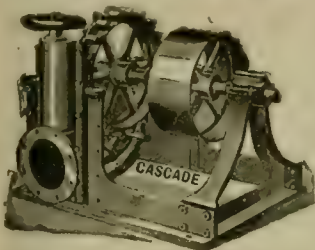
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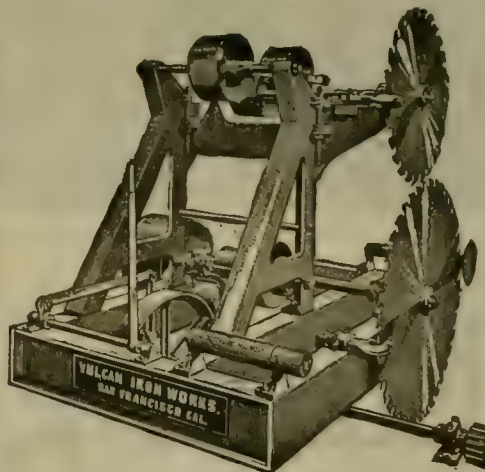
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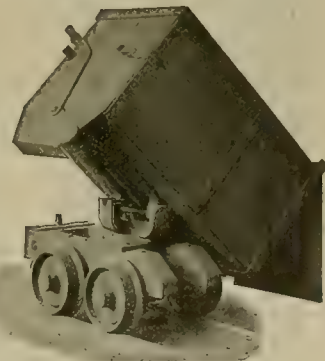
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BROWN'S HORSE SHOE and STRAIGHT LINE ROASTING FURNACES vs PEARCE TURRET FURNACE.

DECISION OF JUDGE HALLETT, UNITED STATES CIRCUIT COURT, DISTRICT OF COLORADO, GIVEN AUGUST 1, 1901.

TO THE MINING FRATERNITY.

We beg to submit for the consideration of parties interested in the treatment of ores, a recent decision of the United States Circuit Court, District of Colorado.

This is a case wherein it is claimed that the roasting furnace known as the Pearce Turret Furnace infringes certain patents granted Horace F. Brown, and, as will be noted, the manufacturers of this furnace, namely, The Stearns-Roger Manufacturing Company, are forbidden from making other furnaces of the Pearce pattern.

The introduction of the Brown mechanically-stirred roasting furnaces have in many instances reduced the cost of roasting ores to such an unusually low figure that wide-spread interest in their performance has been awakened among a large proportion of the mining fraternity.

The great capacity of the Brown Furnaces, their high efficiency, durability, the certainty of obtaining satisfactory results, together with additional features that are characteristic of the type, have tempted other manufacturers to make use of these features in furnaces of their own manufacture, notwithstanding the fact that the essential points of merit are fully protected by letters patent, the validity of which has in every instance been upheld by the higher courts.

The sole right to manufacture the several types of the Brown Roasting Furnaces was acquired by Fraser & Chalmers, and in turn by Allis-Chalmers Company, their successor. We therefore deem it a duty we owe to the mining fraternity to give prompt and due publicity in cases of infringement, and to that end we have recently mailed a large number of circulars giving a recent decision of the United States Circuit Court, District of Colorado, in the case of Horace F. Brown vs. Metallic Extraction Company, wherein the defendants were perpetually enjoined and restrained from making, using, or vending to others the Ropp Furnace or the Ropp Straight Line Furnace, such furnace being an infringement of the Brown patents.

Please note that an acknowledgment of infringement has been made by settlement for a Goodshall furnace, formerly made by Colorado manufacturers, and in use at the Tacoma Smelting Company's works, for which they have paid for infringement.

The apparently insurmountable difficulty on the part of other manufacturers to improve on the Brown type or to produce any new features in furnaces of this character, should be sufficient evidence of the superiority of the Brown Roasting Furnaces.

Respectfully,

CHICAGO, August 12, 1901.

Allis-Chalmers Company.

UNITED STATES OF AMERICA, }
DISTRICT OF COLORADO. } ss.

In the Circuit Court.

HORACE F. BROWN, }
Complainant, }
vs. } No. 4153.
THE STEARNS-ROGER MANUFACTURING }
Co., et al., }
Defendant. }

HALLETT, J. (Orally.) This is a bill to restrain the use of a patent right.

Complainant's patent is No. 471,264, and is for what is called a straight-line roasting furnace. The device mentioned in the patent is for driving rabbles or plows through the furnace to perform a service which was formerly done by workmen moving the ore from doors in the sides of the furnace. As a substitute for the workmen, the first means used was by drawing the rabbles or plows through the furnace by means of chains, moved in a way which it is not necessary to describe, but the machinery thus used was exposed to the heat and dust of the furnace and soon worn out. Complainant's device was to put the power in what he called a supplemental chamber at the side of the furnace and attach the plows to arms extending into the furnace, which moved in a slot in a sort of dividing wall between the furnace and the supplemental chamber.

This patent came before the Court in a suit of the same complainant against the Metallic Extraction Company and was there sustained, and afterwards in the Court of Appeals also sustained, as a useful improvement. In that case the supplemental chamber used by respondents was under the furnace—that is, the supplemental chamber used by respondents was under the furnace and not at the side, and it was held that the circumstance that the chamber was put under the furnace rather than at the side was not material to be considered; the case was within the claims of the patent, whether the chamber be at the side or in some other position in respect to the roasting furnace.

In this suit the respondents' device is different in form and the power is applied from without and not in a supplemental chamber. The patent under which the respondents' claim is known as the Pearce ore-roasting furnace and is No. 488,797. It is circular in form, somewhat in the shape of a wagon wheel, with the periphery as a roasting furnace, and arms corresponding to the spokes of the wheel extending through a slot in the side of the furnace and moved by power at what would be the hub of the wagon wheel. The difference in complainant's furnace and that used by respondents is, that one has a supplemental chamber and the other has not such chamber.

Respondents have sought to show that the supplemental chamber is an essential part of complainant's device, and they have produced a decision made with reference to another patent in the Circuit Court for the District of Washington, which seems to hold that the supplemental chamber is an essential feature of complainant's patent. I have not been able to accept the arguments of counsel in that respect or the decision made by the Circuit Court or the District of Washington.

The inventor of the Brown furnace undoubtedly supposed that the supplemental chamber was an essential feature, because he did not have any means of excluding the outer air from the furnace, and therefore he made the supplemental chamber in which the power could be moved and which would exclude the outer air from the furnace and allow the open slot to be maintained to be traversed by the arms sustaining the carrying plows or

rabblers in the furnace. He sought to put an apron or curtain over the slot, not for the purpose of excluding the outer air but for the purpose of preventing the furnace heat from entering the supplemental chamber. In that he was not successful. His chief difficulty was in maintaining the diaphragm or wall between the furnace and the supplemental chamber which contained the slot in which the arms were moved. At first he failed in that altogether, but by and by was more successful and became, ultimately, able to maintain the diaphragm in pretty good state. As I now recall the testimony, he failed altogether as to the apron or curtain to be carried upon the arms to cover the slot and to prevent the heat from coming into the supplemental chamber. The dominant idea in his construction was to withdraw the power—the apparatus which should move the plows—from the roasting furnace; and he did that by constructing a supplemental chamber in which the power was applied.

The difference between his construction and that of Mr. Pearce is that Mr. Pearce has withdrawn the power altogether from the chamber and has put over the slot in which the arms are moved an apron, which is carried upon the arms, which keeps the slot closed and thus prevents ingress of the outer air into the furnace, which would probably cool it too much.

The difference between the two furnaces is in degree and not in kind. One has withdrawn the power from the furnace partially, the other wholly. Each use practically the same device, except that Mr. Pearce has put an apron over the slot to prevent ingress of cold air, which, in my opinion, is not a matter of invention.

I do not care to discuss the question involved between these patents at greater length at this time, and probably not at any time. The witnesses who have filed affidavits in the case have shown that they can discuss it at great length and present many reasons for one conclusion or the other. To me, or to my mind, the matter all comes in the end to the fact that Mr. Pearce is using substantially the same device Mr. Brown invented. The circumstance that his furnace is circular in form and that he applies the power in a different way is not at all controlling. The patent is one which may be used in various forms of furnaces. The evidence in the former case, and in this case as well, shows that it is used in many forms; in whatever form it may be used, if it is the same as that invented by Brown in the first instance, I think the case is one of infringement.

This is a motion for preliminary injunction, and in particular injunction is asked against the Portland Gold Mining Company, which is under contract with the Stearns-Roger Manufacturing Company for three furnaces which are about to be installed, and perhaps have already been set up. I do not see that it is at all necessary to enjoin the use of those furnaces. Complainant has full remedy in respect to those matters in the way of what may be allowed for royalty in case the patent shall be sustained ultimately, and the only writ which seems to me proper to issue in this case is one which shall forbid the respondents, the Stearns-Roger Manufacturing Company, from making other furnaces of the Pearce pattern. They have had notice from the first of Brown's claim, they were cognizant of the litigation in the other suit, and they ought now to suspend these manufactures until these matters shall be further decided.

Accordingly, we will allow a writ forbidding the Stearns-Roger Manufacturing Company from manufacturing other furnaces of this pattern until the further order of the Court in the premises.

I suppose in this writ there ought to be a bond for, say, \$10,000.00. I am not very well informed as to what the amount of the bond should be.

Given August 1, 1901.

(Revised by JUDGE HALLETT.)

Since the above injunction was granted, Park & Lacy and the Selby Smelting Works have been enjoined by Judge Morrow of the United States Circuit Court in San Francisco, Cal., from the manufacture, sale and use of mechanical roasting furnaces, which the Court holds are infringements upon the Brown patents.

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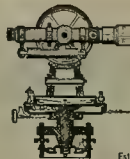
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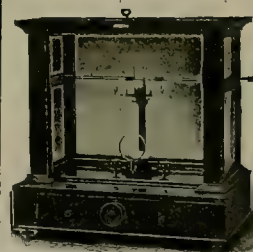
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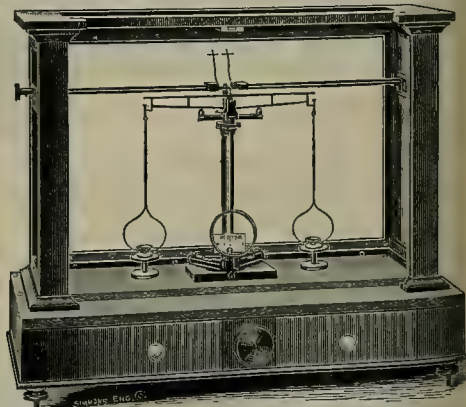
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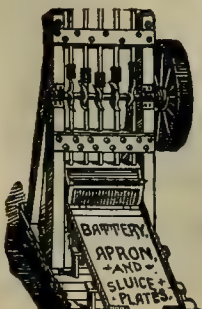
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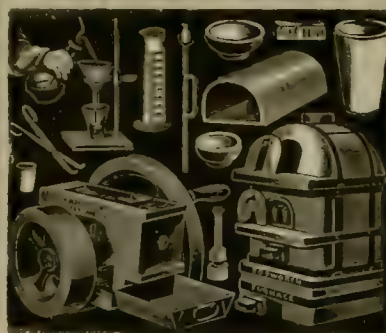
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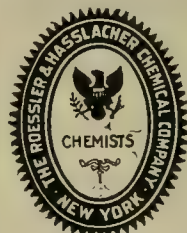
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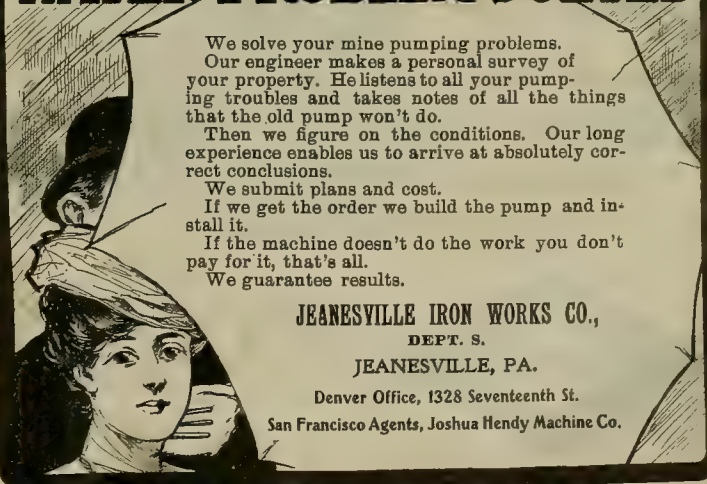
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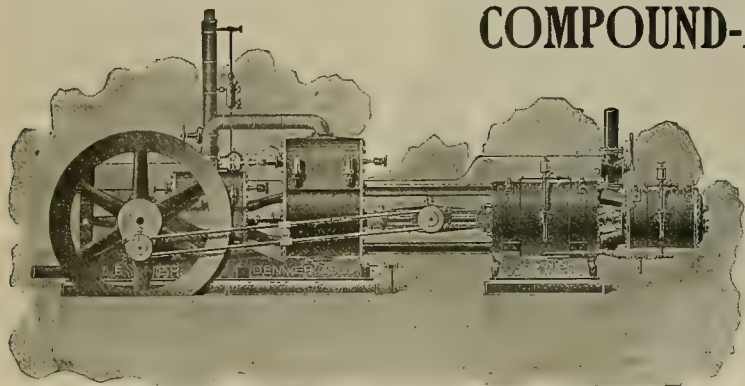
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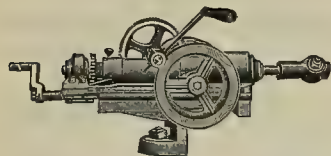
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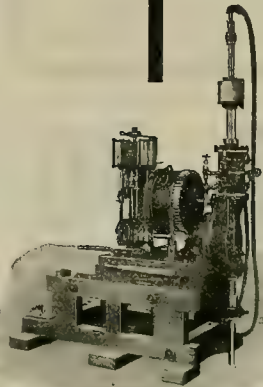
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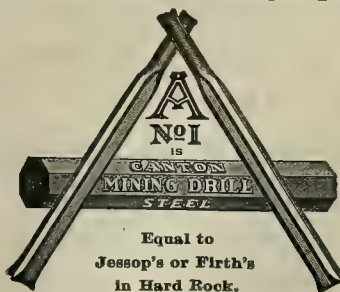
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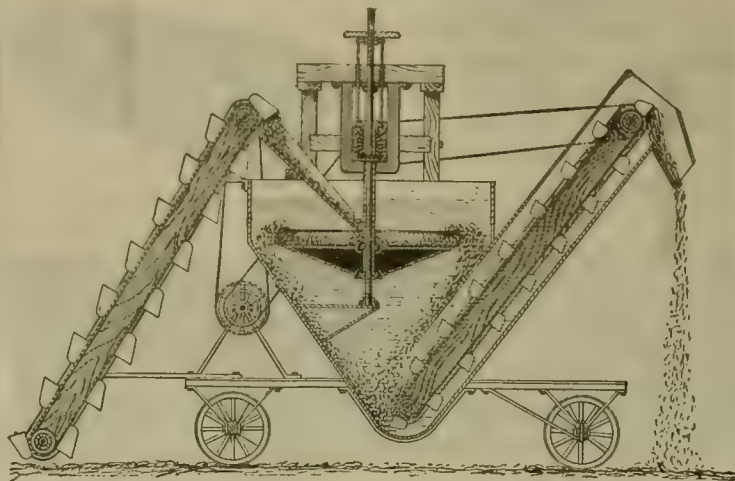
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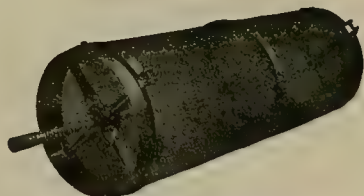
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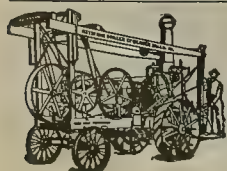
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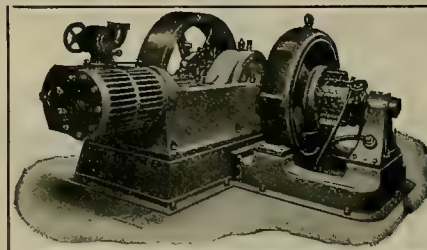
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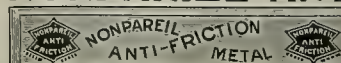


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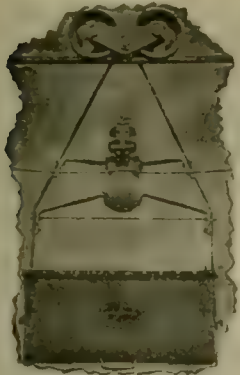
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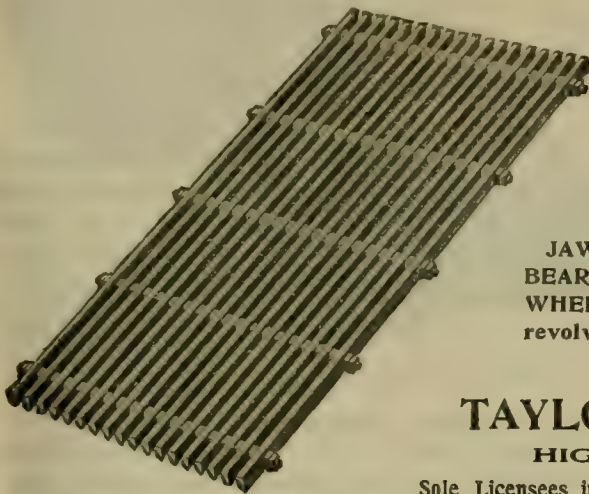


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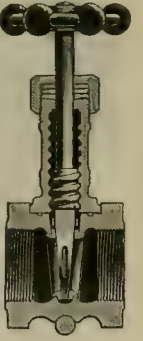


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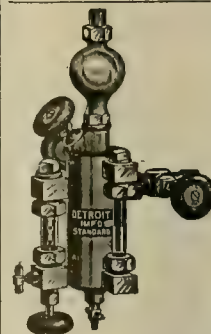
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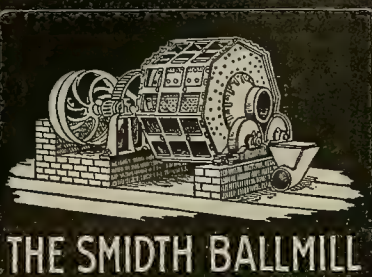
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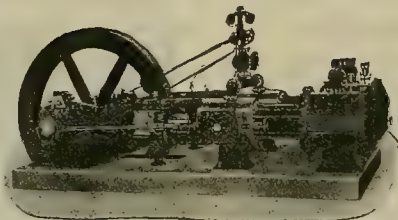
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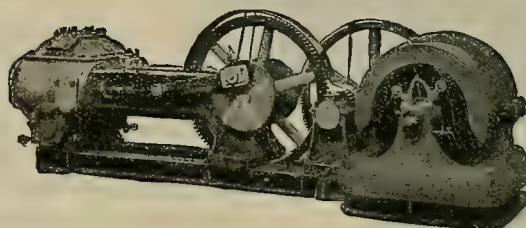


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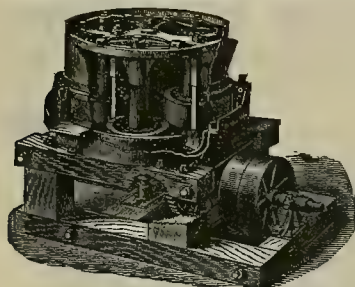
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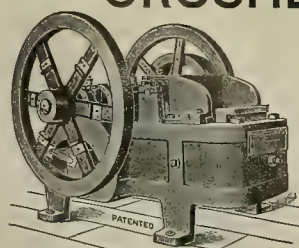
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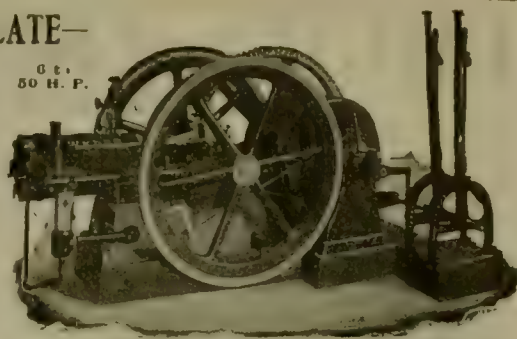


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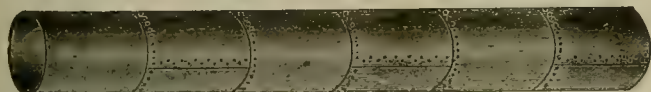
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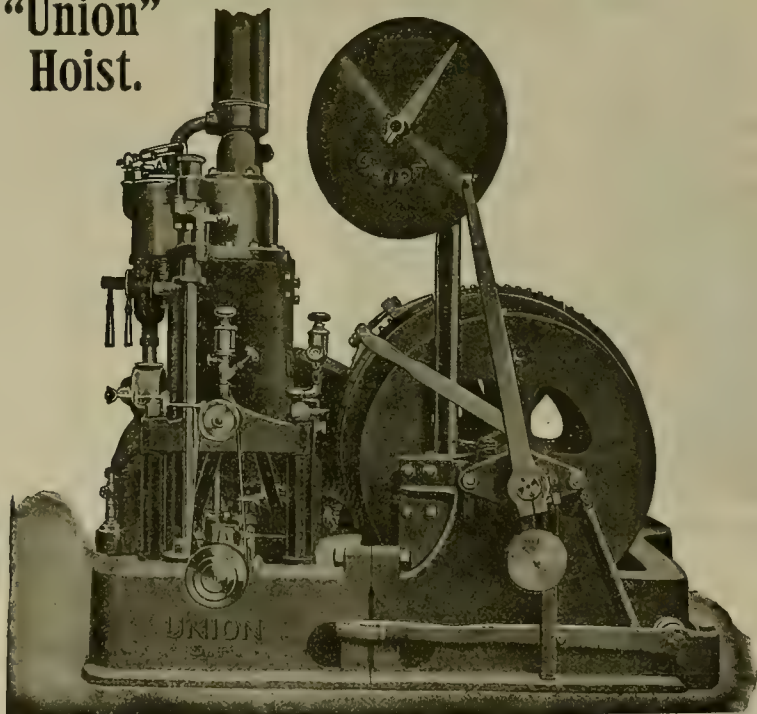
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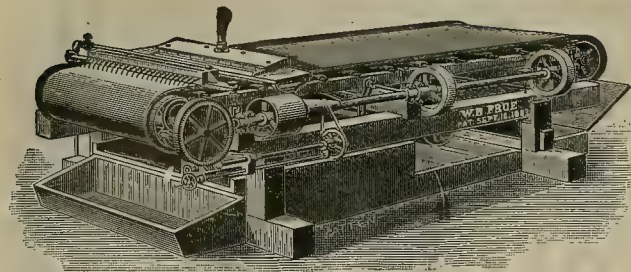
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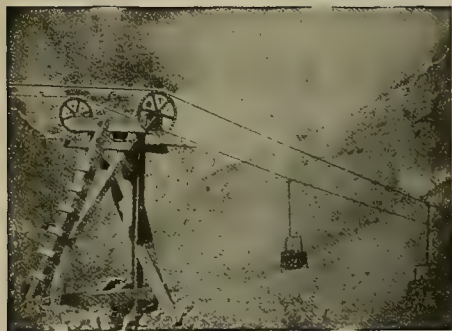
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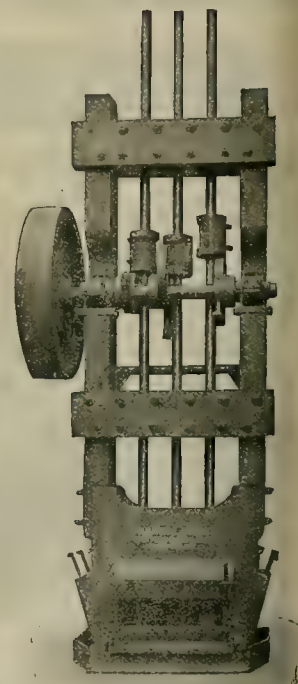
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Number 11.

SAN FRANCISCO, SATURDAY, SEPTEMBER 14, 1901.

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Mine Cost Keeping.

The profit that the miner gets from metal that he digs out of the earth is not a gift from fortune. Finding the metal in the earth may be. Reducing it to his possession is a result from labor, both of the hands and brains. The portion of the latter in the partnership is to secure to itself the performance of the largest possible share of the labor and to the hands the least possible share of the labor. It is a most unselfish division, based on the enlightenment of experience. It has been demonstrated by experience that brain labor eats less of production in costs than the labor of the hands.

In mining, as carried on by large capital, with a view solely to profit, this principle in division of labor is in constant use. With the smaller operations of prospectors and of many individual mine owners it is ignored. At the same time it is this last class whose necessity is the most pressing. At the beginning of all industrial art engaged in for profit is the usefulness of the knowledge of the costs of its production. Mining for the precious metals has been slower than other arts to recognize the value that can be gained by this knowledge. Costs have been kept, but as aggregates rather than in detail. In this, it is the value of detail in cost keeping that is insisted on.

The manager of every mine should keep in debit and credit form an account with every separable part of the work under his charge. It is the custom to aggregate the underground work into two accounts, mining work, and development or dead work. Each of these should be divided so that every separate drift, level or stope should have its own separate account. Part of these openings are dead work, that is, not directly productive at all. They would be closed out monthly, or whenever accounts were balanced for a statement, to an inclusive dead work account. Some of the dead work openings are productive of ore. These would be credited with the commercial metal values they produced, and only the net balance would be transferred in the closing out to dead work account. Other openings, such as stopes, which are distinctively intended as value producing, would have, like the others, debits made against them for labor, explosives, candles, timbers, blacksmithing, tools, etc., and credits by the commercial ore values taken out.

The keeping of such balanced accounts against individual mine openings keeps the management in

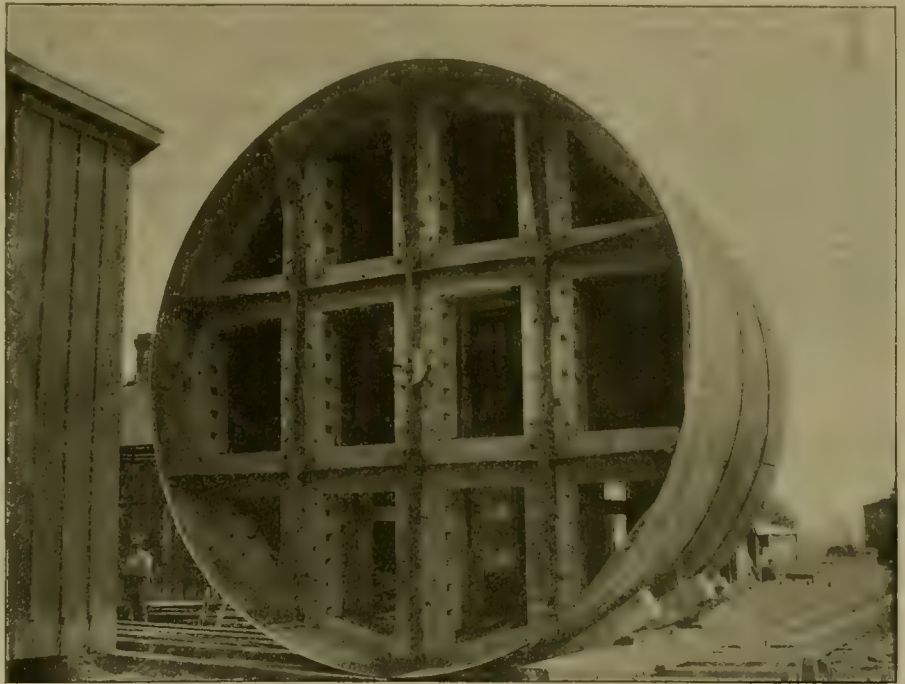


Fig. 2.—Sarnia Tunnel Under Detroit River, Mich. (See page 108.)

constant touch with the weak points of the mine. They show where the mining does not pay. The theory of maintaining an average value to the ore output of a mine by mining ore that pays higher than the average from one opening, and ore that does not pay its cost charges from another, is not defensible as good business. Yet it can readily occur where the average profit margin is small, unless there is a system of accounts such as described to discover and eliminate the mining that does not pay its own costs.

While it is in the preceding that the principal value of accurate detailed accounts resides, the other values of the detailed accounts in eliminating cost wastes, and increasing the efficiency of labor,

are important. The cost of securing the accounts may seem large, yet the saving of even a small amount of unprofitable underground mine work will pay the cost of a very considerable amount of book-keeping.

The same system of detailing the cost charges of milling and ore reduction works will be of similar service in promoting economy of cost and increasing the profit of production. While some wastes are not losses, and some savings are not economies, when the operation of mines and reduction works are considered, the basis of the knowledge of what are, and what are not, is a knowledge of the commercial facts such as can only be obtained by the kind of detailed, conscientious cost keeping described.

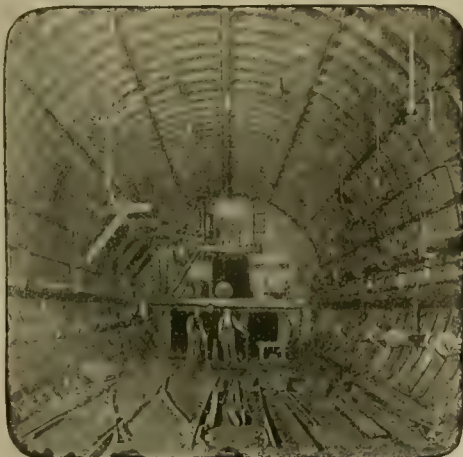


Fig. 1.—Blackwell Tunnel Under Thames, London. (See page 108.)



Fig. 4.—East River Tunnel, New York to Brooklyn. (See page 108.)

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Assay Returns.

Assay returns as made by the public assayers are not always satisfactory in form. The difficulty is that they do not state the facts directly that it was the purpose of the assay to determine. Indirectly the figures given do state the facts, but it is necessary to make calculations on them and introduce elements not stated to arrive at the meaning of the assay.

The difficulty seems to be in the two points of view from which the assay figures are considered. The metallurgist, figuring on his plant or his process, wants to know the full metal content of the ore and the full commercial values in order to have a standard with which to compare estimated or actual results. The prospector and the mine owner want to know what the ore will sell for in order to know what the mine is worth. The practice of the public assayers is not uniform. Some give certificates of return that are satisfactory from the metallurgist's point of view. Some give certificates of assay that might be termed compromises. They do not fully satisfy the requirements of either point of view.

The present form of returns is to some extent a survival from the early days of Western metal mining, when metal production was gold and silver bullion which the mints would buy, less refining charges, at coinage values. The present wide extension of the mining industry, including lead and copper and a large number of metals and minerals of lesser commercial importance, has brought in a source of complication affecting the commercial meaning of assay returns without having induced a compensating change in the form of their statements. The result is more or less misunderstanding of facts and figures and dissatisfaction with assayers.

There seems to be no reason why assayers should not have a common standard form of certificate of assay which should fully meet the requirements both technically and commercially—a form that should give the metallurgist the figures he wants and at the same time give the additional figures and information that the prospector and mine owner want. To begin with, existing commercial conditions must be recognized. This is not a condition of each mine having its own mill and producing bullion. Custom smelters and their system of charges and rebates, and transportation, are new elements that affect commercial values. The waste substances in ores also affect commercial values. Assaying, while technically simpler than formerly, must be reckoned with as commercially more complex than formerly. Prospectors and mine owners should recognize this difference substantially. They should be prepared to pay for more service and better service than in the old days. The laborer is always worthy of his hire. The assayer of to-day gives more than formerly and

should be paid more. Cheap assaying means cheap, unreliable work, or, at any rate, incomplete work.

Precisely as what the prospector and mine owner want is more and better service, for which they must expect to pay; so must the public assayer give what is wanted. The standard form of certificate of assays should state these facts regarding the ore assayed: 1. The character of metallurgical treatment to which it is adapted and for which the assay values are determined. 2. The quantity in ounces per ton of gold and the commercial value. The certificate should state the full coinage value at \$20.67 an ounce, and the commercial value per ounce, \$18, \$19, \$20, or whatever is paid by the buyer made by the character of metallurgical treatment estimated on. 3. The quantity in ounces per ton of silver and the commercial value, in the same manner as for gold. Both the open market value of the metal as bullion should be stated and the value of the metal in the ore that would be paid for by the buyer. State it directly, instead of by percentages which involve calculation. 4. The quantity in percentage of lead and copper, and in pounds per ton of ore, and the market commercial value in the form of metal. Also, the certificate should state the quantity in pounds per ton of this gross amount that the character of metallurgical treatment will secure payment for to the miner, the price per pound that would be paid and the total sum. 5. The same data as under subdivision four for any other metal or valuable mineral. 6. The quantities in percentage of the several rock or metallic substances that are part of the matrix of the valuable metal ores for which the character of metallurgical treatment makes a payment, or requires one, together with the values. 7. Finally, the certificate should state, with the other figures in their order, the public treatment charges, if any, that would be made against the respective metal values, and there should be a separate summary of the highest net values that could be commercially realized from the ore.

Assay certificates, stating figures as called for by the suggested standard form, would be intelligible on their face. They would give the metallurgist what he needs to figure technically from, and they would tell the prospector and mine owner the commercial value of the ore directly. As it is now, the figures of an assay certificate are apt to be deceptive and misleading. They cannot be when completed in the form suggested.

There should be one general blank form which would be used for all assay returns, partial or complete. The style of the blank is something on which this journal would like to have the suggestions of the working assayers. A standard form for this purpose is important enough to justify time and care in the preparation. It should, when adopted, so satisfy present and possible future requirements that no change in it will be necessary.

By its adoption the range of work of assayers will be increased and so will be their responsibility. There should go with it an increase of compensation and a rise in the standard of professional qualifications.

THE foreign ownership of mines in the Pacific Maritime Province of Siberia has been prohibited by the Czar's ukase. The area affected by the order extends from Vladivostok to the Arctic ocean, including the island of Saghalien. The order shuts out foreign capital from the most desirable prospective mines in Siberia. It is the best portion of the placer gold-bearing area, and contains enormous deposits of iron and coal. It is an extension of the order issued some years since prohibiting the ownership of land in the city of Vladivostok by foreigners. The Chinese were particularly aimed at. By the exercise of superior thrift to that possessed by the Russians, they were buying back in peace the land the Russians had despoiled them of in war. The ukase was designed to stop this purchase of the lands by them. Now they lease the land for ninety-nine years instead, discounting an annual ground rental by paying the rent for the entire period in the first payment. In striking contrast with this action of the Russian Government, the Chamber of Commerce of the city of Tokio, Japan, has memorialized the Japanese Government to remove all restrictions on the foreign ownership of land and on foreign mining operations in Japan.

Lead in the Cœur d'Alenes.

The Cœur d'Alene Mining Journal, discussing optimistically the remarkably profitable lead-silver mining of last year and this year in the Cœur d'Alene district of Idaho, says: "It is a fact known to keen students of the lead industry that the trust is preparing to suspend mining in the lead-zinc districts it controls in Missouri and to force the low-grade lead mines of Colorado and Utah into a long, if not perpetual silence."

The optimistic views of a journal dealing with its own local industry are to be expected, but the quotation and more of the same tenor sounds very much like whistling to keep the courage up while going through a dark place with possible dangers lurking in it. The Cœur d'Alene lead-silver mines have been very profitable properties with lead at 4 cents a pound and silver at about 58 cents an ounce. The producing mines do yield about 50% of the total lead consumption of the United States, and the new mines under development may have prospects which will result in an additional production such that the district will yield an amount of lead equal to the entire consumption of the United States.

That ability of the Cœur d'Alene district to respond with any desired yield up to the entire consumption is the principal difficulty of the future price situation of lead. There are other districts that produce lead and other miners who have mines. First of all is the big smelting and refining combination which by controlling lead mines in Missouri in effect owns them and has itself become a miner of lead. If this company would shut down its own mines of lead, to buy lead from other mines that it does not own, it could only be because the profit from purchase was larger than the profit from mining. Judging from facts which the Cœur d'Alene Mining Journal admits, but glides over without making some very obvious deductions, the smelting company seems to be looking the other way. It has bought the Missouri lead mines this year. It did not have to load itself with them unless it proposed to use them. It has restricted the Cœur d'Alene production 25% to gain the time to unload its surplus stock of 40,000 tons of lead. It is to be presumed that it is unloading this surplus lead stock at 4 cents and that by the beginning of 1902 it will be clear of it. It has not renewed its contracts with the Cœur d'Alene mines. It has made new contracts with lead producers in Utah and Colorado which run into 1902 and beyond. The terms of these contracts and the character and metal content of the ores insure that they will be mined and delivered at lower prices for lead.

When this paper commented on the lead situation some months since, it quoted one of the principal men of the smelting company on the situation from its point of view. A remark made in the interview from which the quotation was taken, but not quoted then, was in effect that the smelting company had been holding the bag for the outside producers of lead, but would not continue to. As the situation has developed in the few months since then, it seems to an outside observer that they have got some one else to hold the bag. Unless there is a change between now and January 1st of 1902, the latter date will find the smelting company with no surplus stock of lead to lose on by lower prices, and with its own and contract supplies of lead ores sufficient to meet consumption and insure its profits no matter how the price of lead may tumble. The same date may find the Cœur d'Alene mines with no contract for the sale of its ores and no smelters or refineries to reduce them to commercial metal.

The strength of the Cœur d'Alene lead-silver mines is not in the lead production, the price of which is certain to take very large downward fluctuations, but in the silver, the price of which is much more stable. With sufficient silver content for the ores to pay the costs of mining and reduction for the silver, the lead production will be competitive and can find a market. But all the Cœur d'Alene mines do not carry enough silver in their ores to pay, and such may find it necessary to suspend, and the profits of the others will be seriously curtailed. Even if the Cœur d'Alene mines can supply all the lead consumption of the United States the commercial situation seems against their doing it.

Concentrates.

AN occasional coating with chalk will make a file cut cleaner and last longer.

CALIFORNIA in 1900 produced 500 pounds of the gem turquoise, valued at \$4 a pound.

THE coke used for smelting iron ores must have sufficient structure to hold up the iron ore in the furnace till the latter is reduced and the iron melted.

THE presence of molybdenite in a gold ore makes amalgamation impossible. Its foliated structures makes concentration of the ore difficult.

IT is said that there is a vein of natural coke in northern Sonora, Mexico, which some of the copper smelting companies are mining and using for smelting.

ONE reason for making large shafting hollow is the facility it provides for cooling the shaft in a heated bearing by running a stream of water through it.

THE total production of platinum in California from 1887 to 1900 inclusive, according to the records of the State Mining Bureau, was 3117 ounces, valued at \$15,301.

A COMPOUND pumping engine, using air instead of steam, has been patented. Between the cylinders the air is reheated by passing it through the suction of the pump.

WITH aerial wire rope tramways it is better to move a small load quickly and often than a heavy load slowly. The same amount of material is carried with a much lighter installation.

THE average amount of copper in Rossland, B. C., ores in 1900 was 9 pounds to the ton. In 1899 there was 33 pounds to the ton. The gold content was \$10.60 in 1899 and \$12.30 in 1900.

A CURRENT actuated water wheel has been invented with the buckets set on a sprocket chain instead of radially on a shaft. It is economical of material and has proven practical under use.

THE Waugh process is a method of dry or pneumatic concentration of ores. It is said to have been successfully used in the Black Hills, S. D., separating sulphurets preparatory to chlorination.

GERMAN designs for mine machinery are not as a rule useful models to imitate. They are as a rule needlessly complicated and costly and out of proportion to the service they are intended for.

A NEW record has been made in a rock drilling contest at Leadville, Colo., wherein Hupps & Lindquist of Ouray drove the drill 41½ inches, beating the Chamberlain and Andregg record by 1¾ inches.

THE total production of petroleum in Texas up to and including 1895 was 361 barrels. The production in 1900 was 836,039 barrels. The Beaumont field did not commence producing till this year.

MORE work can be obtained from coal by first burning it in a gas retort and then using the gas in an explosion engine than by burning it under a boiler, making steam and using the steam in an engine.

THE sulphurous fumes from copper roasting furnaces are very corrosive to metal roofing. An effective protection is asphaltum or a paraffine saturated felt coating. "P. & B." paint gives satisfaction.

FOR the royalty on gold mined in the Klondike Governor Ross of the Yukon Territory has recommended that an export duty on gold be substituted, payable at the frontier when the gold leaves the country.

A GOOD preparation for any steel or iron that as part of a structure is being imbedded in concrete or cement is to apply a sand blast to it, cleaning it thoroughly of rust and insuring a perfect contact of the cement with the metal.

IT is considered good engineering practice to push the work of a machine tool to the utmost limit. Get all that can be got out of it in work and get it out quick. This does not imply wasting the tool; it is intended to save the time of workmen.

THE Great Northern Railroad will substitute electric traction for locomotives on the Cascade mountain division, which includes the long tunnel which it has been found so difficult to ventilate and clear of the gases of coal combustion.

THE best stamp mill practice with free milling gold ores is to give the gold early and ample opportunity to amalgamate. Large surface inside plates should be used and the mercury fed to the battery sufficiently to keep the amalgam on the outside plates soft.

FERRO-CHROMIUM is made by reduction from chrome iron ore in the electric furnace. Only the purest natural mineral is used, and the product contains 70% chromium. It is used in hardening armor plate and armor-piercing projectiles. It is so hard that it will cut glass.

THE locator of a mining claim cannot close up roads, trails, ditches or easements of any nature that exist at the date of location. There can, however, be no easements except such as are public uses acquired in conformity with law, imposed on the land of the claim after location except by the consent of the claimant.

TO compensate for the wearing down of the dies in a stamp battery increasing the height of the screen discharge and decreasing pulp passing through it two devices are available. The screen frame can be changed, putting them in with successively lower inside chock

blocks, thus keeping about the same height of discharge, or the screens can be changed and successively coarser meshes used as the height of discharge increases. The first method is preferable.

THE failure of a miner to test, immediately on going into a working face after a blast, the rock overhead and high on a side for loosened masses, is considered cause for his peremptory discharge. The testing should be done before anything else and any rock that is loosened must be removed before starting to work in the face.

NEAR the north end of the island of Saghalien, which belongs to Russia and lies to the northward of the Japan Islands, there is a petroleum field of considerable extent and value. There is a lake of petroleum and a number of petroleum springs. A concession has been granted to a Russian to develop it, but nothing has been done with it yet.

BROMINE, in the modification of the cyanide process in which it is employed, is used as bromo-cyanogen—a white, crystalline, salt-like compound. It is added to the ordinary cyanide solution in proportion by weight never more than one to two, less even of the bromine salt being preferable. The process is patented in this country.

THE German schemes of ore concentration involve more hand sorting and grading than is practicable in this country with its very much higher labor costs. Hand picking here is limited to sorting out waste rock from the ore. At the most two grades of ore are made. In Germany as high as five grades of ore are made by the hand picking.

WITH cheap coal fuel, it is now considered by engineers that the copper line wire of an electrical transmission plant at the coal field is economically as efficient for the transportation of the energy of the coal for distances up to 200 miles as a railway coal train. The same consideration would apply with petroleum in place of coal as the fuel.

HIGH-GRADE drill steel should preferably not be heated in the forge over cherry red, so the manufacturers say. The difference between grades of drill steels is principally in the nature of the hardening process to which they have been subjected. The high-grade steels are what are known as air-hardened and hold the cutting edge better than carbon steels.

THE title to a mine owned by a mining corporation cannot be passed by the deed of a stockholder, even if he is the only stockholder and owns all the stock. The corporation must make the deed, and the stockholder must revive the corporation and provide it with a board of directors and officers, who must then proceed in strict conformity with the corporation statutes and the company by-laws.

BY using zinc fume or dust for precipitation in the cyanide process instead of zinc shavings, a closer and more uniform precipitation of the gold and silver is obtained, the gold slimes produced are richer, the cost for the zinc consumed is lower and the process is quicker. The U. S. Circuit Court has declared the De Lamar patent on the use of zinc dust invalid, so that it can be used without royalty payment.

WHERE the so-called "high bars" by a river have been rich in gold, it is safe to assume that the channel where the water flows is correspondingly poor. The pay lead at that particular point was in an old channel that has been left on one side of the present flowing stream. The river bed above and below the high bar is, however, likely to be fully as rich as the bar, and the gold from the up-stream end may have become distributed some distance down stream in the present river bed below the place of the old channel crossing.

IT is the practice in some mines to obtain filling for the open stoped ground by drifting into the wall rock and blasting it out. It is always desirable to figure the costs of this filling against filling brought from the surface. Breaking out of filling is much less costly on the surface than underground. To use it requires a chute from the stope to the surface or a compartment in the shaft made into a chute. With the latter kept full from the top it can be taken out at the bottom and moved in cars to the stope where required.

THE mineral chromite has been found satisfactory as a furnace lining for the smelting of copper ore. It is not fusible, nor is it attacked chemically by its own constituents or the constituents of the fusion of copper ore. Where it has been used successfully the walls were built of lumps of the native mineral, well compacted. No cementing material was used. The chromite came from Turkey and contained 52% of chromic acid. It has been suggested that 44% ore should be equally serviceable. This last is the grade of the California mineral.

LATE investigations tend to prove that copper in any amount below 1.3% does not injure the quality of steel. The detailed conclusions arrived at are as follows: 1. Between 0.5% and 1.3% copper has no deleterious effect on either the hot or cold property of steel. 2. A very large amount (2%) makes the steel more liable to be overheated. 3. In small quantities it slightly raises the tenacity and the elastic limit, but, unlike phosphorus, does not sensibly make the steel liable to fracture under sudden shock. Like carbon, it reduces the power of the steel to extend under stress, but this is not pronounced when the quantity is small. The effect is more marked when large quantities are present. 4. If the evidence of the tests of open-hearth steel made can be confirmed,

copper, instead of producing redshortness, has the contrary effect of changing redshort steel into steel which will roll without cracking.

THE variation of the needle stated on old mining maps of California mines should not be depended on where retracement of the lines is undertaken. Nor is a new determination of the variation certain to give a guide to the restoration. The facts are that many of the old surveyors made their surveys as if there was no hereafter. The variation was simply guessed at and assumed. About the best way to establish a variation with which to retrace the old lines is to assume that the old variation was a guess and apply to it as a correction the change in variation that the time interval elapsing since the survey has made.

THE proposition to mill and cyanide the Transvaal gold ores in plants established underground in the mines, while not impossible, cannot be accepted as certain to insure an economy of cost. At least 25% of the final tails would have to be hoisted to the surface owing to the gain in bulk of the mined and milled ore over ore in place. There would be extra costs of repumping and filtering the water used. As to saving in hoisting, three-fourths of the ore would be compelled to carry all the extra costs and still show a saving which seems a doubtful possibility. The flat cost of shaft hoisting of ore is now very small.

CONTINUOUS non-use of a water right for five years after it has been used would probably be held to operate to create a forfeiture, which would give a subsequent appropriator the priority of right to it. A ditch is a separate property from a particular water right and does not become forfeit for non-use. It may be abandoned; and, if abandoned, can be appropriated just as any other abandoned property. A claim can be made for a right of way in connection with another appropriation of a water right may be made which will actually appropriate an abandoned ditch. Unless, however, the ditch is abandoned, it cannot be appropriated legally even if it is on public land.

WHERE a mining district boundary or county boundary is not defined on the ground, the notice of location of a mining claim which subsequently appears to have been recorded at the wrong office is not invalidated thereby. The correction can be made by recording either the original copy with its endorsement of when and where recorded, or a certified copy of the erroneous record. It is preferable to make the corrected notice of record in this way rather than to make a record of a new copy. A relocation does not have to be made. There is no requirement in the nature of a time limit for making the correction. It is ordinary business prudence to make the record in the right office without delay, and at the same time to record the evidence of the earlier record.

THE nickel ores of Oregon closely resemble the New Caledonian ores. The deposit is in Douglas county, near the town of Riddles. Several square miles are covered from a few inches to 20 feet deep, averaging about 10 feet, with a layer of soft, porous serpentine full of cavities. Part of the cavities are filled with chrome iron, iron oxides and the nickel silicate. The deposit is a concentration following alteration through weathering, in a manner similar to the weathering of deposits of copper sulphides. The great mass of the deposit is low grade. The mining can be done very cheaply—with a steam shovel, in fact. With concentration a high-grade nickel ore should be separable, which could be made into a matte on smelting with such copper sulphide ores as are being worked in northern California.

THE Neill leaching process is a treatment based on the use of sulphurous acid for the recovery of copper from the oxide and carbonate ores. These minerals are reacted upon by sulphurous acid with the formation of cuprous sulphite (Cu_2SO_3). This salt is not soluble in water, but is soluble in water containing sulphurous acid—that is, the leaching solution must have an excess of the acid in it over that required to make the reaction. The copper is precipitated by driving off the excess of acid by heat. The precipitate is cupro-cuprous sulphite ($\text{CuSO}_3 \cdot \text{Cu}_2\text{SO}_3 + 2\text{H}_2\text{O}$) and contains 49.1% of copper. It is a heavy, crystalline compound, of dark-red color, which settles readily from the solution and can be washed by decantation, dried and reduced to metallic copper by fusion on the hearth of a reverberatory furnace. Very small amounts of other metals are dissolved and the product is very pure copper. In practice the ore is crushed to pass a 20-mesh, put in covered tanks and kept in a state of agitation while a current of sulphurous acid from the generators is forced through it. The copper will pass into solution in from one to four hours. The solution is drawn off through a filter press to separate the slimes. The latter and the sands are washed once with water, which is used over with the next charge. The solution in the precipitating tanks is heated with exhaust steam, precipitating the copper salt. The plant can be arranged to save nearly all the sulphurous acid except that combining with the copper. One pound of sulphur is required to convert four pounds of copper into sulphite, or, with the loss from the excess, one pound converts three pounds. The sulphurous gas can be obtained either by burning pyrite or sulphur. Roasting a copper sulphide ore to an oxide will provide ample acid for its own treatment. A test on a mixture of copper carbonates and some oxide in a siliceous ore gave 95% extraction. The recovery of the copper by fire alone affects a great saving over leaching, where iron is required to precipitate the copper.

Railroad Tunnels, Their Construction, Maintenance and Operation.*

This paper was prepared solely and purely from the construction point of view, with no regard whatever to operation.

The subject of the construction of tunnels is divisible into a great number of classes. From the point of view of construction, tunnels built for sewers, aqueducts or mines or for railroad service are identically the same.

A tunnel proper presupposes by its name that it is an underground passageway constructed from within, without breaking the surface of the ground. Those works, however, commonly called tunnels, which are constructed from the surface by methods of "cut and cover," are, properly speaking, "subways," but since in the public mind they are classed as the same thing, and as the resulting use of the completed work is identical, I propose to class such subways as are constructed for railroad service in cities as though they were tunnels, and give a brief explanation of their methods of construction also. This, you will see, is the more necessary since there is hardly any complete subway which has not had some portion of the work constructed as a tunnel, as the constructing engineer finds it best adapted to the local conditions and to economy in construction, and the two classes are so closely interwoven as to be inseparable in practical execution.

Speaking first of subway construction, the simplest condition is that in which the geological formations give solid rock, or some hard, self-supporting material in which to work—in which the surface has no buildings closely adjacent which would preclude free use of dynamite to break up the materials, and in which there are no street cars, or pipes, wires or other subsurface improvements to be considered or taken care of. In this case the work is usually laid out to full width for the external lines of the permanent linings, and either blasted and picked down or channelled by drilling the side lines and the entire center core blasted out, working it in benches, one in advance of the other, the number depending entirely on the depth to bottom grade. These ideally simple conditions are seldom found in practice, for if rock exists below the surface it usually has a heavy bed of loam or sand overlying, and in cities the interference by surface improvements is very serious and complicating; and it is the presence of these surface and subsurface improvements in cities which makes subway construction in rock formation so enormously expensive.

Under these conditions, it is easier and cheaper if the formation is found to be in clay, dry sand or other softer material than rock, which can be picked and shovelled, as there is then no danger of injury to the pipes, which require only ample support for maintenance in perfect safety. Under these conditions, the usual method necessary to adopt is to take out side trenches one on either side of the construction in which to construct the side walls. These trenches are supported with sheet piling or timber in every way similar to the methods used in our cities in sewer construction.

In the construction of a portion of the Reading Subway, in the city of Philadelphia, the loose soil was supported and maintained by driving piling on either side of the trench, the trench being made wide enough for the extreme bottom width of the wall construction. The sheet piling was cross-braced and supported by string timbers and cross-ties or spreaders, and the material excavated usually by pick and shovel to the depth of the bottom of foundations.

In this method of construction there are used sundry machines, such as the Carson trench machine, or the Lidgerwood Company's machine, for handling the material rapidly and economically and saving labor; but the essential principle common to them all is the excavating of the material, while at same time maintaining support to prevent caving of the sides. This is a perfectly simple piece of work, involving no difficulties of any moment, and certainly not more so than the difficulties found in excavating any foundation for buildings in the same neighborhood.

With the side walls constructed, it is a perfectly simple matter, involving merely labor, to excavate the central block or core between, as was done in building the subway under the Andrássy Strasse in the city of Buda Pesth.

On the Reading Subway, in the city of Philadelphia, recently constructed, the side walls were completed and the roof formed of the segmental arch.

The construction of subway in this manner, by excavating side trenches first and later taking out the core, reduces considerably the liability to accident and damage over the plan of taking out the full width at once, in cases where that width is of considerable dimension. If the width of subway to be constructed is great, as it is in cases where double-track railroad and standard-gauge cars are to be used, then the cross-timbering requires to be very heavy, as the handling of this involves a great deal

additional labor, which is materially reduced in the narrow trenches, made of timber.

In the construction of those portions of the subways in the city of Boston, which were built from the surface, it was usual to carry the street traffic on a false floor made of timber.

In this work in Boston a considerable amount of the construction was done as tunnel built from within, without breaking the surface of the street.

Of course, this method of subway construction becomes more difficult if quicksands or running sands are met, and is always considerably more expensive where large volumes of water require to be dealt with. In those cases the construction in this form is liable to become very much more expensive than the construction in tunnel, as the methods peculiarly adapted to tunnel construction in cases where water or running sand are encountered are not feasible in construction of an open cut.

The question as to whether a tunnel should be built by methods of cut and cover, or from within as tunnel, depends partly on local considerations of soil, but principally on the relative quantities of material to be moved and the relative cost of removal of the classified excavation. This is commonly equal at a depth of about 40 feet from the surface to bottom grade, although in the construction of the Blackwall tunnel in London it was found advantageous to build the approach on the Kent side of the river in open cut and cover down to a depth of about 70 feet below surface.

The essential condition in tunneling is the support of the face, sides and roof at all times and under all conditions. It is comparatively easy in the exercise of care and forethought to prevent any commencement of caving, even in the very worst materials in

rying out the work. Under these conditions, air pressure is almost entirely used in conjunction with percussion drills, and, if the rock is unusually hard, it is nowadays essential to install this method, even if the tunnel is short, as hand drilling in hard rock is slow and expensive.

The taking out of the heading in all these rock tunnels is the expensive part of the work. The removal of the bench is the cheaper work which brings down the cost of the tunnel as a whole. It is, therefore, obvious that the construction of a small-sized tunnel in rock is, yard for yard, more expensive than the construction of a double-track railroad tunnel; but there is a point in matter of size below which it is not in any way advantageous to go. The width of a tunnel must be sufficient to get an angle of cut such as to allow of blasting out the rock, and if the width is decreased in a rock heading below this point there is no economy to be gained.

There are large numbers of rock tunnels, however, which are constructed in seamy rock, or in shales which disintegrate, or in which "falls" occur which at times endanger the work and make construction difficult. In these cases it is essential to timber every bit of the tunnel as it is taken out for the support.

The explosives used in rock tunnel work are an important factor. Dynamite long ago displaced black powder. Now the gelatines are pushing dynamite hard.

Tunneling in soft ground introduces more complications.

The principle then involved is to drive a heading in advance of final tunnel construction which is so small that the ground will not cave in until the workmen can put in timber or plates to support it. Once hav-

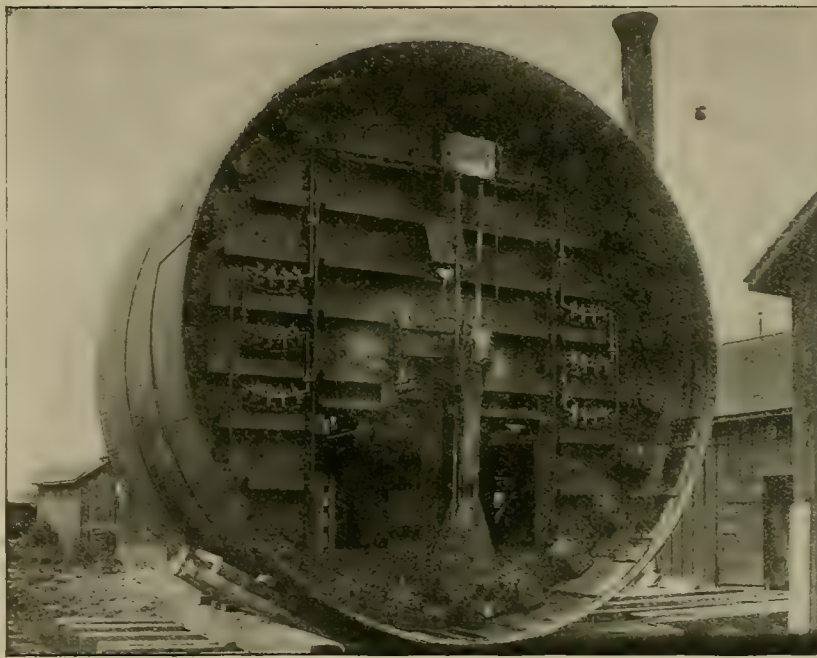


Fig. 3.—Sarnia Tunnel Under Detroit River, Mich.

which tunnels can be constructed; but if ever any bad ground once gets a start at moving or caving, then hardly any power on earth can stop it.

In railroad construction the greater proportion of tunnels are built in rock formations of one sort or another. Outside of tunnel construction under rivers and waterways, or under streets of cities, these are constructed usually for one of two causes—either to cross from one watershed to another through an intervening line of hills, or to cut off curves on a line of road to shorten distance and improve alignment. The ideal condition is one in which the rock formation is absolutely self-supporting. The heading is usually driven from 50 to 100 feet in advance of the removal of the bench to full cross-section. The size of this heading depends upon the size of the completed tunnel. If it is a tunnel for a single-track railroad, the heading is usually the full width of the tunnel, while the height will be 8 or 9 feet, and the removal of the single bench in the rear will take out the entire tunnel to the full section required.

The construction of the tunnel is carried on by drilling either by hand or machine drills, and these holes are driven like a letter M. The lines of holes forming the center V are known as the "cut," while the straight legs on the sides are known as the "side round."

In cases where a tunnel is short in length and the expense of installing a power plant would not be warranted by the length of tunnel to be constructed, then it is usual to use hand power for drilling; but in all cases where the tunnel is of considerable length and the distribution of expense due to the cost of plant over the entire tunnel forms a reasonably small item, then this installation is of the greatest economy to the contractor, and the greatest efficiency in car-

ing the heading driven, the same principle applies for the enlargement. For as each small portion of the completed section is taken out, timbering or plates are put in place to support the ground from caving, until the entire section has the excavation removed, leaving an opening consisting of a mass of timber supports, vertical, horizontal and in every direction, with poling boards or plates of light sheet iron supporting the external surface, inside of which the permanent lining can be constructed, after which the supporting timbers, or struts, can safely be removed.

An arrangement used in the Hudson River tunnel is to drive a small heading consisting of a pipe of light sheet steel called a "Pilot tube," connecting its plates internally together by bolts, piece by piece. From the outside circumference of this pilot tube are struttled the poling boards or plates for the external full section, which necessitates the use of much shorter struts than the long ones which are necessary with the use of a mud sill.

In the construction of the portion of the subway recently completed in Paris, a good deal of the work was excavated by driving narrow headings or tunnels on each side of the street, in which were constructed the side walls of the completed tunnel. The same plan was adopted in portions of the Boston subway, and in both of these cases there was used an arching shield to support the superincumbent ground while the roof of the tunnel was being constructed.

The most difficult branch of tunnel construction is obviously that in ground which is so treacherous that it is unsafe to use any of the foregoing methods of construction. In such materials as quicksand, or water-bearing soil, or in decomposed schists, or under other conditions, there is no safe, feasible way of

* Abstract of a paper by J. V. Davies, read before the New York Railroad Club. See illustrations on front page.

construction but by use of pneumatic pressure in conjunction with hydraulic shield; and there is no method as rapid in progress or as safe in execution as this.

The use of air pressure permits of the support of the ground and the checking of the flow of water by equalizing the pressure within with the superincumbent weight of the ground. In order to use pneumatic pressure, the installation of an air lock is necessary. The air lock consists simply of a cylindrical tank or boiler with valves or doors at each end, opening in the same direction—that is, inwards against the pressure. The illustration (Fig. 1) of the air lock installed in the Blackwall tunnel under the Thames, in London, indicates two air locks on the working deck, which are used for the support of materials and for the ordinary use of the employees.

In addition to this, there is placed near the roof of the tunnel a third lock, which is known as the "emergency lock," and is for the use of men in cases of possible flooding of the tunnel when the lower lock might become submerged. The driving of tunnel is by use of hydraulic shield, and the two illustrations now to be given are of the front (Fig. 2) and rear (Fig. 3) portions of the shield which was used in driving the Sarnia tunnel under the Detroit river, between Canada and the United States.

The principle involved in the use of a shield is the support of every portion of the face, the roof and the sides of the tunnel, until permanent lining is completed and in place. As will be noticed, the shield consists of a bulkhead divided into sections, or compartments fitted with doors. In front of these compartments the men employed excavate as much of the section as they can possibly take out, and this amount depends upon the solidity and condition of the ground.

As each portion of ground in advance of the shield is removed, the hydraulic jacks in the rear are forced out, pushing the shield forward to take up any advance which is gained in excavation.

As the shield is advanced the length of a ring of plates—that is, from 16 to 24 inches in length—a new ring is erected in the rear of the shield bolted up and the shield is then again ready to push itself forward, using the pressure of the rams against the already completed length of lining, and advancing another section to permit of the putting in of yet another ring of plates.

A completed section of this type of tunnel is illustrated (Fig. 4) representing the East River gas tunnel, which clearly shows the rings of segmental plates bolted up and completed, forming a cylindrical tube of cast iron which is impervious to water and of great strength as well as durability.

In the construction of tunnel by shield method the erection of the shield is the first necessity, and there are three conditions under which this is usually carried out. In the Blackwall tunnel driving was commenced from an immense vertical shaft 58 feet diameter, sunk near the river front. In this case a circular hole is left in the lining of the shaft and from which construction proceeds.

The second method, which was used in the Sarnia tunnel, where a great open-cut approach was dug from the surface and the shield rolled down into place to commence tunnel construction.

The third condition was that adopted in the East River tunnel, where the erection had to be done by making an enlargement in the tunnel itself, which was supported during erection of the shield, and the shield built up in place piece by piece underground and under air pressure and driving started from that point. This is the most awkward condition and involves the greatest difficulty, owing to the cramped space in which men can work.

Tunnels are lined with various materials. If it is built in rock formation and cut stone is obtainable, then very common stone masonry is used for the side walls, and cut stone or brick for the arching. If good brick is obtainable, then the arching can be more substantially put in of brick in cement, where the side walls can be built of stone; but where good Portland cement and good hard rock is to be had, there is nothing more satisfactory than concrete lining throughout for both side walls and arches. The greatest secret in good, substantial lining of tunnels is the thorough and efficient packing of all space and crevices in the rear of the lining itself, and the bad packing in back of masonry is the cause of most of the trouble which the roadmaster has in the maintenance of his railroad tunnels.

In that respect the use of concrete for the entire lining is extremely advantageous, for in that case the centers or molds forming the internal surface of the lining are the only ones used, and the concrete is rammed to fill every space clear back to the construction timber or to the original ground itself, and the benefits resulting therefrom are very great. If the material through which tunnel was constructed is bad and liable to disintegrate, then it is essential—even with the use of masonry rock lining—to ram concrete in the rear of it, to fill all cavities and to prevent any commencement of caving of the ground, which is invariably the source of trouble originating in tunnel work.

At the time that we constructed the East River gas tunnel at Seventieth street, we had at one time in opening right through to the waters of the East river. We ran the pressure up to fifty-two pounds

per square inch, and worked under that pressure, while tomato cans and rubbish of all kinds came right into the tunnel from the river bed. The safety of tunneling by shield methods, and with the use of compressed air, was illustrated in the Blackwall tunnel in London, where the largest iron-lined tunnel ever built—25 feet internal diameter—was driven within 5 feet of the bed of the river with perfect safety. They had, of course, great difficulties to contend with; but the tunnel is built and is now in operation.

For the illustrations used we are indebted to the courtesy of Compressed Air.

Electric Copper Refining.*

When the electrolytic process was first attempted the cost of producing the refined copper by this method was as high as \$30 per ton, and even eight years ago the charge was \$20. This has come down now to \$8 to \$10 per ton. This is the direct result of improving the refineries and of economizing in the electric power. Some of the improved copper refineries in the Lake Superior region are the finest in the world, and they have brought the cost of refining the copper to the lowest cost. The question of saving in the fuel and operating expenses has been the most important in the development of this industry, and the solution has been one of gradual growth and experiment. In the last year the saving has been further reduced through the introduction of improved machinery and an increase in the motive power.

Both the multiple and the series processes are employed in electrolytic copper refining in the lake copper region, as well as in other parts of the country, and the relative importance of the two systems depends, in a measure, upon circumstances and topographical surroundings. The multiple system is the most generally used, and it is of greater relative value. The difference between the two systems is chiefly in the mode of arranging the electrodes. In the multiple system only one-half the anode copper is used as in the series system.

When the copper comes from the mines to the refinery it is in crude bars or cakes, such as produced by ordinary smelting and concentration processes. They are tested first as to the quality and value of the copper in them, and also as to amount of gold and silver mixed with the crude ore. They are then heated in a reverberatory furnace and prepared for the electrolytic bath in the form of anodes $2\frac{1}{2}$ feet in length and 2 feet 3 inches across. The anodes are carried from the furnace to depositing tanks to alternate with the cathodes of pure copper sheets. In each tank of the ordinary refinery there are about twenty to twenty-five anodes and twenty-five cathodes, separated from each other by about 14 inch.

In this multiple system the tanks are arranged in terraces, with each row separated by about 2 inches. A free circulation is kept up between the tanks, and an overflow pipe keeps the tanks properly filled, new fluid entering as fast as that drawn off. Electric traveling cranes usually supply the tanks with their material and carry the copper bars to the bath from the furnace. In the Anaconda refinery the electric traveling crane handles the copper from the time it enters the refinery until it is finished. In this refinery there are some 500 tanks arranged in rows or terraces, usually in pairs of double tanks.

The electrolyte prepared for the bath contains in solution 16% of bluestone and 5% of free sulphuric acid. The current enters the first tank through its anodes in multiple and proceeds through the bath to the adjacent cathodes, and from these it passes by copper connectors to the anodes of the second tank or bath. The copper connectors between the tanks are plates about 6 inches long, and they are carefully insulated from the negative conductor of the next bath. They connect the end of one anode in one tank with the cathode in the other.

The average electric current required for a refinery of thirty to fifty tons per day is about ten amperes to the square foot, counting both sides of the anode plate, and the flow of this current varies considerably, according to the quality of the anode. The amount of precious metals, arsenic and other impurities in the copper anode decides to a great extent the flow of the electric current. About twenty-four days and nights are necessary to transfer electrolytically the copper anode of about 275 pounds to the cathode plate. There is danger in employing a high current, for if the copper should have considerable silver and arsenic mixed with it the purity of the copper would be greatly lessened. The high current would carry part of the silver and arsenic to the copper to reduce its purity. Some copper is so pure and free from all impurities that as high as fifteen and twenty amperes can be used without danger. Several of the tanks are always out of circuit, and are in the process of being cleaned.

After the copper has been refined it is further prepared for commercial purposes in other parts of the refinery. Some is melted in the reverberatory furnaces again and cast in bar molds. These are of suitable size for drawing into wire and rods for commercial purposes. The deposited sheets of pure copper are also sold just as they come from the bath under the name of commercial cathodes. Sometimes the rich

copper is full of precious metals, carrying often as high as 500 and 600 ounces of gold or silver to the ton. All these metals and impurities are separated from the copper by the electrolytic process and deposited at the bottom of the tanks. They fall there in the form of a black mud. This mud or slime is carefully gathered up and screened. It is then boiled or stirred up in a lead-lined vat with hot dilute sulphuric acid. Hot air and steam are provided through a lead coil by means of an injector to help oxidize and dissolve the impurities of the mud. In this way the gold and silver are gradually concentrated in about eight to nine hours. There are usually, besides the gold and silver, such impurities as arsenic, antimony, bismuth, lead and tellurium.

There have been many improvements and changes in the last year or two in the copper refining methods. One of the most annoying features of the electrolysis is the action of the impurities on the cathodes. The arsenic, antimony and silver tend to collect on the cathodes, and, in time, make them unfit for use. In copper regions where the ore runs high in silver this difficulty is peculiarly hard to overcome, and it causes a considerable additional expense through the employment of laborers to wash the anodes. There have been a number of methods to overcome this trouble. The one commonly resorted to is to purify the electrolyte by filtration through a bed of copper oxide, and another by boiling with metastannic acid. Another method of purifying the electrolyte has been to cause oxidation with jets of air, but this process has not yet attained any great success. At the Anaconda refinery a process of purification is to pass the impure electrolyte repeatedly through a filter of oxidized granulated copper, and then later introduce jets of air.

In the series system of electric copper refining in this country special cathodes are not used, but one side of the anode plate serves as cathode. In this process the fluid itself serves as the conductor of the current and no copper connections between the anodes are necessary. The copper plates are arranged in series, and the tanks are much larger than those used in the multiple system. The fact that a good deal of scrap copper is produced by this process of refining makes it unpopular, and only a few refineries are in existence in this country. This drawback is a serious one, and not easily remedied. The multiple process requires only one-half the anode copper used in the series system with the same cathode surface. The cost of maintaining a plant to the highest efficiency has been found to be greater in the series process than in the multiple, but the former saves somewhat in the less loss of energy. The location of the refinery is consequently a factor of some importance, for if fuel is cheap or the power is supplied by waterfall the series system has little to show in its favor in the cost of the electric current. The cost of erecting a refinery is nearly the same in each system, with a slight advantage in favor of the series process.

It is estimated, on the whole, by modern refiners that there is a saving of nearly \$2 per ton of refined copper in the multiple system, and this difference in some localities and under favorable conditions can be even further extended. In some mining regions where the refinery is a part of a converting establishment, and run in conjunction with it, the saving has been as much as \$3 50 per ton. This is partly due to the fact that the anodes can be made directly from the converters. The average current efficiency of the multiple process is 95% as against 90% for the series process under similar conditions. Where the electric power is expensive, or fuel high-priced, the difference in the current efficiency of the two processes must always decide in favor of the multiple process of refining copper.

Extension of the Snoqualmie Falls, Wash., Power Co.'s Installation.

Two years have elapsed since the first current from Snoqualmie Falls was carried into the cities of Seattle and Tacoma, Wash., and already the initial installation has proven too small and the capacity of the plant is to be enlarged to meet the increasing demand for power. At the falls are installed four generating units, each consisting of a water wheel direct connected to a 2000 electrical H. P. Westinghouse three-phase alternator. At the same transmission voltage now employed—30,000 volts—it is proposed to develop and transmit 12,000 H. P. more, making a total output of 20,000 electrical H. P. The electrical machinery is to be wholly furnished by the Westinghouse Electric & Manufacturing Co.

The Abner Doble Co. of San Francisco, which furnished the water wheel equipment for the initial installation, are figuring upon placing their wheels in the new extension. If an impact wheel is used there will be a single wheel on each end of each generator shaft, and each wheel will be driven by a single jet of water 14 inches in diameter, the two jets combined being sufficient under the existing head of 270 feet to give the requisite power. The two water wheels and the generator between will be built on a single hollow shaft of oil-tempered nickel steel.

The present underground generating station, which is 200 feet long, is to be lengthened out 150 feet up stream to make room for the new installation. A

*GEORGE E. WALSH in Electrical Review.

new penstock is to be built which will carry 50% more water than the old one. The new transmission line will require 125 tons of aluminum wire. At Tacoma a brick and stone sub-station is now being erected. The entire cost of these improvements will be in the neighborhood of \$400,000. It is expected that the first of the new generators will be delivering current into Seattle and Tacoma within the next nine months. The generating machinery will consist of three 3000 K. W. (4000 H. P.) rotating field generators of the two-bearing type, generating a three-phase current at 1100 volts and 7200 alternations. The speed is to be 100 revolutions per minute. Each generator will require an exciting current of 320 amperes, approximately, at 125 volts. For exciting these three generators a 200 K. W., eight-pole, direct-current generator of the two-bearing type is to be used. At 175 revolutions per minute it is to deliver under normal load a current of 1600 amperes at 125 volts.

The current which is generated at 1100 volts is to be raised to a line potential of 30,000 volts by nine 1000 K. W., oil-insulated, water-cooled transformers. These are to be delta-connected on both the primary and secondary sides. It is estimated that each transformer will weigh 11,000 pounds and require 500 gallons of oil. The switchboard that is to be installed is to consist of fourteen panels of white marble, and is to be of the special type that was furnished for the original installation.

Vein Structure.

TO THE EDITOR:—Your issue of August 17th contains an interesting extract from the testimony of J. Ross Browne in the recent Grass Valley lawsuit. I trust you will also print the views of Mr. Janin on the same subject. The diagrams of vein structure given by Mr. Browne are ingenious and in part represent types accepted by mining geologists generally. The last one is, however, so much like the "lenticular" type often mentioned in technical literature that I feel impelled to call attention to its peculiarities, especially since the discussion can have no bearing on the lawsuit.

Throughout the southern United States the "gold belt" veins occur as lenticular bodies of quartz in schistose rocks. These lenses lie across the folia, approximately at right angles to the plane of schistosity. In the copper veins of the Piedmont region and those of Ducktown, Tenn., flat cross fractures are observed running at approximately right angles to the walls. In many ore deposits of the Rocky Mountain region the veins are similarly fractured; it is seen here at Butte. These fractures bear the same relation to the vein walls that the quartz lenses of the Appalachian deposits do to vein walls, which there coincide with foliation planes. This structure is illustrated in Fig. 1. It is figured by T. A.

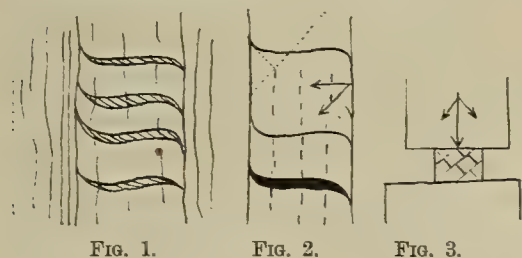


FIG. 1.

FIG. 2.

FIG. 3.

Rickard in his account of several Australasian ore deposits. In many cases it is evident that this fissuring, whether quartz filled or not, is simply a result of rock strains accompanying movement of the fissure walls. Thus Fig. 2 shows that a force applied as indicated will not only produce vertical movement along the main fissure but also transverse, and where veins are crossed by flat fractures it is evident that post-mineral movements have taken place. These movements have often permitted circulating waters to produce secondary enrichment of the veins. It is the same in effect as the well-known double fracturing and apparent faulting of synchronous fractures formed by the vertical pressure in crushing tests of building stones, Fig. 3. The Pennsylvania vein structure, as interpreted by Mr. Browne, seems to me to accord more nearly with this theory and to be due to sheeting fissures which sheared the rocks, the horizontal component of the force-producing strain cracks between the fissures. In other words, the rending force, instead of producing a clean-cut single fissure, was distributed in several parallel non-persistent vertical fissures, the strained rock between being fractured.

WALTER HARVEY WEED.

Butte, Mont., Aug. 24, 1901.

For an engineer, in addition to the ability to form correct judgments, must be added the capacity to make a skillful and correct presentation of them in well chosen and fitting English. This ability cannot be taught by training in the writing of compositions, themes, reports, etc., alone; it must in great part be absorbed by an early and habitual reading of the best that has been written in all lines of thought.

A Plea for Greater Simplicity in the Language of Science.*

By T. A. RICKARD.

Scientific ideas are with difficulty soluble in human speech. Man, in his contemplation of the flux of phenomena at work all about him, is embarrassed by the want of a vehicle of thought adequate for expression, as a child whose stammering accents do not permit him to tell his mother the new ideas which suddenly crowd upon him when he meets with something alien to his experience.

Our knowledge of the mechanism of nature has been undergoing a process of growth, much of which has been sudden. It is not surprising, therefore, that the incompletely formed ideas of science should become translated into clumsy language, and that inexact thinking should be evidenced by vagueness of expression. This inexactness is often veiled by the liberal use of sonorous Greek-Latin words.

The growth of knowledge has required an increase in the medium of intellectual exchange. New conceptions have called for new terms. Sir Courtney Boyle has pointed out that the purity of a nation's coinage is properly safeguarded, while the verbal coinage of its national language is subject to no control. Specially qualified persons prepare the standards of gold and silver. This ensures the absolute purity of the measures of commercial exchange and gives the English sovereign and the American gold piece, for example, an assured circulation along all the avenues of commerce. It is not so with the standards of speech. The nation debases its language with slang, with hybrid and foreign words, the impure alloys and the cheap imports of its verbal coinage, mere tokens which should not be legal tender on the intellectual exchanges. France has an academy which in these matters has much of the authority given to the mint, whose essayers test our metal coins, but in our country the mintage of words is wholly unrestricted, and, as a consequence, the English language, circulating, as it does, to all the four corners of the globe, has received an admixture of fragments of speech taken from various languages, just as the currency with which one is paid at the frontier, where empires meet, includes the coinage of several governments, each of which passes with an equally liberal carelessness.

Science ignores geographical lines and bemoans the Babel of tongues which hinder the free interchange of ideas between all the peoples of the earth. Nevertheless, the international character of technical literature is suggested by the fact that the three languages—French, German and English—are practically recognized as the standard mediums of intellectual exchange. One of these affords the most lucid solvent of thought, another is the speech of the most philosophical of European people, and the third goes with world-wide dominion, so that each has a claim to become the recognized language of science. The brotherhood of thinking men will have been fully recognized when all agree to employ the same tongue in their intercourse, but such a "far-off, divine event" is not within the probabilities of the present. Consequently there remains for us only to make the best of our own particular language and to safeguard its purity, so that when it goes abroad the people of other countries may at least be assured that they are not dealing with the debased currency of speech.

Barrie has remarked that in this age the man of science appears to be the only one who has anything to say—and the only one who does not know how to say it. It is far otherwise in politics, an occupation which numbers among its followers a great many persons who have the ability for speaking far beyond anything worth the saying that they have to say. Nor is it so in the arts, the high priests of which, according to Huxley, have "the power of expression so cultivated that their sensual caterwauling may be almost mistaken for the music of the spheres." In science there is a language as of coded cablegrams, by the use of which a limited amount of information is conveyed through the medium of six-syllabled words. Even when not thus overburdened with technical terms, it is too often the case that scientific conceptions are conveyed in a raw and unpalatable form—mere indigestible chunks of knowledge, as it were, which are apt to provoke mental dyspepsia. Why, I ask, should the standard English prose of the day be a chastened art and the writing of science, in a great scientific era, merely an unkempt dressing of splendid ideas? The luminous expositions of Huxley, the occasional irradiating imagery of Tyndall, the manly speech of Le Conte and of a very few others, all serve simply to emphasize the fact that the literature of scientific research as a whole is characterized by a flat and ungainly style, which renders it distasteful to all but those who have a great hunger for learning.

To criticism of this sort the professional scientist can reply that he addresses himself not to the public at large, but to those who are themselves engaged in similar research, and he may be prompted to add to this the further statement that he cannot pitch the tone of his teaching so as to reach the unsentimental intelligence of persons who lack a technical edu-

cation. Furthermore, he will claim that he cannot without the use of the terms to which objection is made. However, in condemning the needless employment of bombastic words of classical origin, in place of plain English, I do not wish to be understood as attacking all technical terms. They are a necessary evil. Some of them are instruments of precision invented to cover particular scientific ideas. Old words have associations which sometimes unfit them to express new conceptions, and, therefore, fresh words are coined. The complaint lodged against the pompous, ungainly wordiness of a large part of the scientific writing of the day is that it is an obstacle to the spread of knowledge.

Let us consider the subject as it is thus presented. In the first place, does the excessive use of technical terms impede the advancement of science? I think it does. It kills the grace and purity of the literature by means of which the discoveries of science are made known. Ruskin, himself a most accurate observer of nature and also a geologist, said that he was stopped from pursuing his studies "by the quite frightful inaccuracy of the scientific people's terms, which is the consequence of their always trying to write mixed Latin and English, so losing the grace of the one and the sense of the other." But grace of diction is not needed, it may well be said. That is true; and it is also true that a clear, forceful, unadorned mode of expression is more difficult of attainment, and more desirable in the teaching of science, than either grace or fluency of diction. One must not, as Huxley himself remarks, "varnish the fair face of Truth with that pestilent cosmetic, rhetoric;" and Huxley most assuredly solved the problem of how to avoid rhetorical cosmetics and yet convey deep reasoning on the most complex of subjects in addresses which are not only clear as a trout stream, but are also brightened by warm touches of humanity, keen wit and the glow of his own courageous manhood. Nevertheless, though clearness of expression be the first desired, yet grace is not to be scorned. When you have a teaching to convey it is well to employ all the aids which will enable you to get a sympathetic hearing. Man lives not by bread alone, much less by stones. He likes his mental food garnished with a sauce. Let the cooking be good, of course, but a chef knows the value of a well-seasoned adjunct to the best dish.

Our language is capable of a grace and a finish greater than we give it credit. That it is possible to write on geology, for instance, in the most exquisite, simple English has been amply proved by Ruskin, whose "Deucalion" and "Modern Painters" contain many pages, describing accurately the structure of rocks and mountains, and dealing with their geological features in language which is marked by the most sparing use of words which have not an Anglo-Saxon origin.

The next aspect of the enquiry is whether the language of science, apart from the view of mere grace of style in literature, is not likely, in its present every-day form, to delay the advance of knowledge by its very obscurity. Leaving the reader's feelings out of the argument, for the present, it seems obvious that the whole purpose of science—namely, the search after truth, which is best advanced by accuracy of observation and exactness of statement—is hindered by a phraseology which sometimes means very much but oftener means very little, and, on the whole, is most serviceable when required as a cloak for ignorance. To distinguish between what we know and what we think we know—to comprehend accurately the little that we do know—surely these are the foundations of scientific progress. If a man knows what a thing really is, he can say so, describing it, for example, as being black or white; if he does not know, he masks his ignorance by stating in a few Greek or Latin terms that it partakes of the general quality of grayness. Writers get into the habit of using words that they do not clearly understand themselves, and which, as a consequence, must fail in conveying an exact meaning to their readers. Many persons who possess only the smattering of a subject are apt to splash all over it with words of learned sound, which are more quickly acquired, of course, than the reality of knowledge. Huxley said that if a man does really know his subject "he will be able to speak of it in an easy language with the completeness of conviction with which he talks of an ordinary every-day matter. If he does not, he will be afraid to wander beyond the limits of the technical phraseology which he has got up." If an scientific writer should complain that simplicity of speech is impracticable in dealing with essentially technical subjects, I refer him to the course of lectures delivered by Huxley to working men, lectures which conveyed original investigations of the greatest importance, in language which was as easily understood by his audience as it was accurate when regarded from a purely professional standpoint.

(TO BE CONTINUED.)

TO SUCH AN EXTENT has labor been eliminated from the manufacture of iron in the United States that every man employed about the iron mines in every capacity delivers four tons of iron per day, and in the production of the large steel works to-day represents only about one man power, including the clerical force, to between two and three tons of steel.

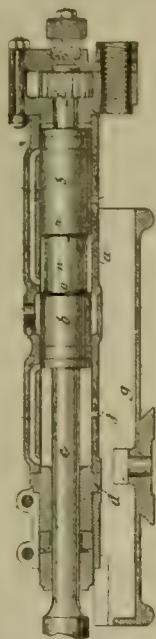
* Read before the American Association for the Advancement of Science, Denver meeting, Aug. 27, 1901.

Mining and Metallurgical Patents.

Patents Issued September 2, 1901.

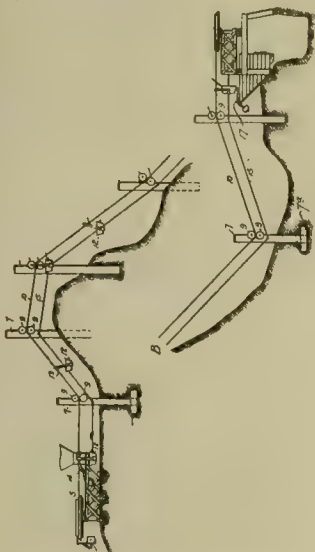
Specially Prepared for the MINING AND SCIENTIFIC PRESS.

VALVELESS ROCK DRILL.—No. 681,428; R. L. Ambrose, Tarrytown, N. Y.



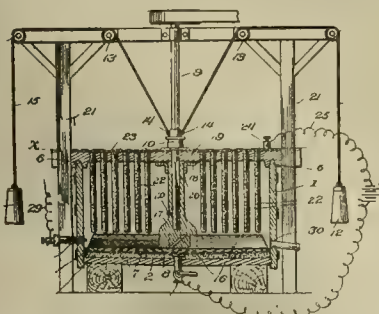
A cylinder having separate admission and exhaust ports for each end of cylinder, and a common inlet port, of a piston, having a reduced central portion and adapted to control ports, ports being so located with respect to each other and to piston that during a rearward stroke of piston exhaust closure at rear end is substantially simultaneous with admission cut-off at forward end, but is prior to exhaust release thereat.

AERIAL WIRE-ROPE TRAMWAY.—No. 682,149; J. H. Montgomery, Denver, Colo.



An endless cable and buckets, a line of single poles, brackets mounted on poles and projecting on opposite sides, two pairs of pulleys mounted on each bracket, and a pair of co-operating pulleys engaging cable on each side of pole, individual pulleys of each pair, engaging cable at same point and being located respectively above and below cable.

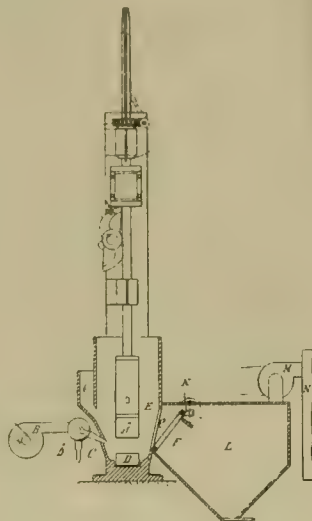
ELECTROLYTIC APPARATUS FOR EXTRACTING PRECIOUS METALS.—No. 682,155; C. P. Tatro and G. Dellus, Seattle, Wash.



A tub, a metallic pan in bottom, mercury in pan, a

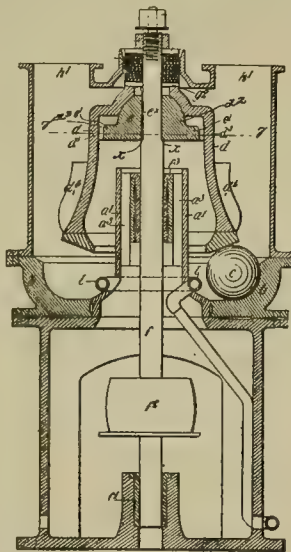
lid for tub, a series of carbons attached to and depending from lid inside of tub and connected together to form an anode, an agitator vertically journaled in lid and having screw propeller-shaped blades located to revolve below carbons, one or more balance weights connected with lid, vertical guide-ways for lid, and electric connections between carbons and one side of a battery and between pan and mercury and other side of battery.

STAMP MILL.—No. 681,858; F. B. Pettengill, Los Angeles, Cal.



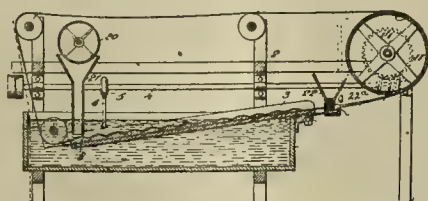
A stamp, a mortar with a die at bottom, a chute to feed ore onto die, a downwardly directed air-blast nozzle arranged below ore chute to direct an air blast across path of ore and to direct ore toward die, an opening being provided just above path of blast in mortar wall opposite air-blast nozzle, an outwardly and upwardly slanting screen in opening, and means for shaking screen.

CRUSHING OR PULVERIZING APPARATUS.—No. 682,087; W. Kitto, Hammersmith, Eng.



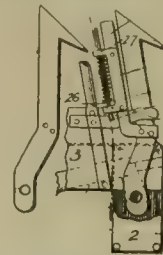
A vertical driving spindle, a bell-shaped ball propeller driven by spindle and provided on its outer surface with vertical, radiating wings, a ball raceway into bell-shaped propeller, open to atmosphere at its lower end and through which and propeller an air current is created by radiating wings, ascending air-escape trunks arranged outside propeller, and an air-supply pipe constructed to direct air onto ball raceway.

CONCENTRATOR.—No. 682,053; P. C. Forrester, Spring Valley, Ill.



A water tank, a vibrating sluice arranged in tank, block arranged in bottom of sluice and having varying height, projections diminishing toward outlet end of sluice, and an endless belt movable through sluice and upon blocks.

CHAIR FOR MINING CAGES.—No. 681,675; M. H. Beck and J. R. Caynor, Victor, Colo.



A cage, an upright chair on cage provided with a hook adapted to interlock with a suitable support of a mining shaft and means for operating the chair.

Owens Lake, Inyo County, Cal.

Written for the MINING AND SCIENTIFIC PRESS.

The Reno Development Co. have been engaged for sixteen years in exploiting Owens lake, in Inyo county, Cal. It is an alkaline body of water, containing as much common salt as average sea water. About 3% of its total weight is carbonates of soda, a little over 1½% is sulphate of soda and it is estimated it contains over 1,000,000 tons of borax. The borax, however, is in such a dilute solution that no means are known at present to utilize it. At the present time the only soluble mineral is the carbonate of soda, of which about 10,000 tons are produced annually by the Reno Co., and sold either in its natural state as produced—a compound of carbonate and bicarbonate of soda plus water of crystallization—or as soda ash, the natural product calcined.

In the natural form it is shipped to borax works at Alameda, Cal., and used to produce commercial borax from colemanite (borate of lime). The larger use of the natural soda is in the form of soda ash. The furnace used for calcining is in the form of an upright kiln, the fuel used being vaporized petroleum. The market for the soda ash produced has been so far with the glass works and washing soda factories of San Francisco. Lately a very promising market has been opened in Japan. This soda ash is considered equal to the finest English soda ash with which it competes for a market in Japan.

Owens lake has at the present time no outlet. Ancient shore lines indicate that the level of the lake was once 190 feet higher, at which time it had a southern outlet. The lake has an average depth of perhaps 40 feet and an area of 100 square miles. It is estimated to contain over 40,000,000 tons of the carbonate of soda. The carbonate of soda is recovered from the waters by pumping the water into clay vats and then evaporating by the sun's heat until the soda precipitates as crystals. These crystals require a certain amount of skill in the regulation of the crystallization to obtain in a state of purity, and such crystallization can only be carried on in the hot months of summer. The final result of the summer's work is a cake of soda from 2 to 4 inches in thickness over the surface of the crystallizing vats. These vats cover an area of an acre each, about 100 acres in all.

The works of the Reno Dev. Co. are at Keeler on the eastern shore of the lake and the terminus of the railroad. R. J. Laws of Carson is general superintendent and Herbert L. Wrinkle is resident superintendent at the lake.

In a lecture on mechanical rock drilling, delivered by M. Henri Ghysen, Ingenieur des Mines, Belgium, he described two important drivings, one by means of hydraulic rock drills and the other by electric drills, arriving at the following conclusions: The electric rock drill is far more suited to the work of collieries than is the hydraulic drill, on account of its slight weight and easy management. It is set up with less difficulty, and if the advance obtained is not quite so great, this circumstance is largely set off by the diminished cost of working. The hydraulic rock drill is, however, calculated to render good service in very hard rocks when great speed of execution is required, and under which circumstances the advance made with the electric drill becomes slight. On the whole, in the works required at collieries the electric must be regarded as more economical than the hydraulic drill.

It may be taken as an axiom that a perfect mine report cannot be made without a plan—that is, of course, unless it be something that can be condemned at a glance and summed up with a terse "No good." This plan or map must be something to show where samples are taken, where pay shoots begin and where they end, the reference of one level to another and the hundred and one details which will occur to the engineer.

The Government telegraph cable between Juneau and Skaguay, Alaska, has been successfully laid and now in operation. With the completion of the construction of a short gap in the land line between Glenora and Ashcroft, in British Columbia, Juneau will be in telegraphic communication with the rest of the world.

MINING SUMMARY.

Specially compiled and reported for the
MINING AND SCIENTIFIC PRESS.

ALASKA.

JUNEAU.

W. J. Sutherland of London, president of the Alaska Perseverance M. Co., has obtained possession of the Jumbo mine in Silver Bow basin near Juneau. In 1889 a 10-stamp mill was erected on this property and continued in operation until 1895, when the mill was carried away by a snowslide. Work has been begun on the reopening of the mine under the supervision of C. H. Pierce, formerly of the Treadwell mine on Douglas island.

VALDEZ.

Revised estimates make the output of the Chesterhena district \$500,000, and possibly \$600,000. A stampede to the new diggings on Bremner river was started late in August. Prospectors who come in to Valdez for supplies refuse to give particulars. Some gold, but not pay, was found on this river in 1898. The new diggings are about 90 miles northeast of Valdez and have an open season of about eight months. Several parties returned to Valdez from an examination of the copper discoveries in the Chittyna and Tasnuna country confirm the report that immense ledges of copper, azurite and bornite, running from 20% to 50% copper, exist in those districts.

ARIZONA.

GRAHAM COUNTY.

H. E. Butterfield, interested with C. B. Stocking in a gold mine near Morenci, says they are running a tunnel to cut the ledge, which is over 2 feet wide on the surface and rich in free gold.

PIMA COUNTY.

Miners from Willcox say the placer diggings recently discovered 4 miles from Dos Cabezas mining camp are rich and more extensive than at first supposed. Some big nuggets have been taken out. The discovery was made by a Mexican shepherd, who kept it secret for some time. A large number of claims have been staked out and a half dozen Americans are taking out from \$5 to \$15 a day. They report that the ground becomes richer as they get to bedrock. Water is scarce in the canyon and they are compelled to pack gravel which bears gold to a distant stream.

A Denver syndicate has bonded a prospect owned by P. O'Day and P. Sullivan, near Tucson, in the Catalina mountains, at \$75,000, 10% being paid down. Work is to be commenced with thirty men.

PINAL COUNTY.

It is reported that the Zeckendorf interests have taken control of the Ray copper mines, limited, by paying to the English stockholders all they expended in railroad construction and improvements at Kelvin. It is also stated that the new owners will resume operations very soon.

YAVAPAI COUNTY.

The Howell M. Co. have ordered boiler, hoist and pump for the Iron King mine, Big Bug district. The hoist, of capacity to sink 600 feet, will be placed on shaft No. 2. There are 638 feet of crosscuts and drifts, all in ore. The company will put up substantial buildings.

The Rich Hill M. Co. has been incorporated at Phoenix, capital \$100,000, by H. A. McKee, C. W. McKee and F. Pendergast. The claims proposed to be worked by the company are called the W. Y. O. D. claims and are located in Rich Hill, near Octave.

CALIFORNIA.

AMADOR COUNTY.

The High Point M. Co. of Des Moines, Iowa, has brought suit for \$11,000 damages against C. E. Brown and wife of Plymouth, because of a violation of contract of sale of the Gowanus and Blue Belle mines at Plymouth.

CALAVERAS COUNTY.

The Calaveras M. Water & Power Co. has been incorporated. Capital, \$200,000; office, San Francisco; works, Calaveras county; directors, L. Pence, C. J. Pence, R. W. Ostrom, A. Schloss and D. Fricot.

INYO COUNTY.

G. F. Willis and J. C. Roeper have leased the old Green Monster mine, near Independence Station, for two years. The mine has been idle for many years. Should working tests prove satisfactory, the lessors expect to be able to ship a carload of ore daily.

J. C. McMillan has shipped a 60-ton lot of ore from the Eva Belle mine, near Plute Station, averaging probably \$50 a ton. The work done on it is through a 130-foot tunnel, at the end of which drifts have been run along a 5-foot ledge of ore averaging about \$20 per ton value. It carries

a small percentage of copper, and gold and silver in about equal values.

KERN COUNTY.

The Gold Coin and Stanford mines at Randsburg are milling ore at the Red Dog mill, which is expected to average \$50 per ton, or better. These mines are owned by Nixon, Kuffel and Mann of Randsburg, and up to the present they have hoisted with a whim, but increasing depth has made a change necessary and a gasoline hoist is under consideration.

MARIPOSA COUNTY.

At the Garibaldi mine at Bull Creek, near Mariposa, the main double-compartment shaft is down 365 feet.

MONO COUNTY.

The molybdenite mine recently discovered by Robert & Cameron is on the eastern tributary of the Walker river, near the summit. They are working the mine and intend putting up a plant to prepare the ore for shipment.

NEVADA COUNTY.

At the Seven-Thirty mine at Nevada City the shaft is down 200 feet and drifts are being run on a ledge from 8 inches to a foot in thickness. The Seven-Thirty is being developed by Reilly, Voss & Co.

A company represented by G. W. Root of Sacramento and J. W. Heiser has bonded the Green Mountain mine, near Nevada City, and operations will be commenced about October 10th. The shaft is down 600 feet and the new company will sink deeper.

The old Grizzly Hill hydraulic mine, near Blue Tent, has been leased by a Sonoma company, headed by G. P. Hall, J. P. Berry and C. H. Ohm, and will commence operations soon. It is proposed to quarry the gravel channel and to crush the ore in a Crow mill having a capacity of 250 tons a day.

At the annual meeting of the Home M. Co. at Grass Valley D. J. McFall was re-elected Supt. It is the intention of the company to put in more stamps soon. The old board of directors was re-elected, L. J. Rose being made president, R. J. Bonestell secretary.

PLACER COUNTY.

At the Santa Fe at Canada Hill, Westville P. O., gravel has been struck which prospects. W. Morgan, D. Kirby, E. Wooldridge, A. R. Green, W. N. Hazen and H. G. Ponting of Auburn own the mine.

PLUMAS COUNTY.

C. R. Thompson is pushing work at his mine on Rich gulch, below Quincy, and is moving a quartz mill to the property. It is reported that the mine has developed a 4-foot vein of high-grade ore.

SHASTA COUNTY.

The Sybil mine, near French Gulch, which produced fast enough to be bought by G. A. Von Kruze from the proceeds of the ore, is now producing rock that is too rich for the Keswick smelter to handle. It is claimed to go over \$200 a ton, that being the limit on rock worked at Keswick. Twenty tons have been taken out by two miners in a month. The ledge averages 8 inches in width. A depth of 400 feet has been reached. The owner will install a power drill.

Fifty carloads of copper bullion have already been shipped from the De Lamar smelter, at De Lamar, to the refinery at Elizabeth, N. J. Wood is being hauled in from Pitt river by 57 teams. An addition to the bullion room is being constructed to receive the output of the new converters. The brickqueting, or "brick," machine now runs at night as well as day, 10-hour shifts, with seven men on each shift.

L. M. Lane and C. F. Daugherty have granted an option to E. Holden and R. J. Jennings on their copper claim near Sims. The bond is in the sum of \$1500 and time one year. The bond proposes to develop the property.

J. W. Parmelee, owner of the Minnesota mine near Iron Mountain, states that he intends to reopen the mine. A hoist and pump, both operated by water power, will be put in. There is a 10-stamp quartz mill on the property, but as the ore is base it will be sold to the smelters at Keswick. The Iron Mountain railway passes but a short distance from the mine and affords easy transportation. Associated with Mr. Parmelee is A. Longstreet of Chicago.

The South Fork M. & Dev. Co., B. F. Rodgers, superintendent, have 24 miners employed. This Boston company is developing several gold properties, including the old Chicago mine, on South Fork of Clear creek, about four miles northwest of Igo. Mr. Rodgers is driving a 2900-foot tunnel with air compressor drills, and has the tunnel in 800 feet.

A new copper camp will probably be opened up in Shasta county on the north bank of Pitt river in what is known as the Kosk Creek country. Several properties in this district were exploited to some extent several years ago by Redding people,

and now extensive development work is to be done. W. Murray of Shasta is at the head of a company of Redding and Red Bluff people developing a property in the Kosk Creek district.

The Balaklala copper mine, near Copley, is reported bonded for \$650,000, with \$20,000 paid down.

L. B. Hines of Harrison Gulch has bonded the Cadiz, Ohio, Isabelle, Blue and Pacific mining claims, in the Harrison Gulch district, to W. J. Thurman at \$6000.

SIERRA COUNTY.

W. J. and G. A. Charters of Canton, Ohio, have located a ledge which bears copper ore. It is between Sierra City and Downville.

The Four Hills Co. is installing a 50-ton cyanide plant at the mine near Sierra City. A new assay office has been added. The work of sinking the shaft has been resumed. Forty-five men are now employed. Connected with the mine is a small sawmill with a capacity of 5000 feet per day. The power to operate the machinery of this mine is furnished by a 200 H. P. electric plant, run by water under 925 feet head from a chain of lakes near by.

W. Lawry of Downville, operating on Rock creek, has struck a rich body of gravel. The shaft is down 160 feet and 6 feet in gravel when a heavy flow of water stopped sinking. A pump is to be installed and the shaft continued to bedrock.

J. A. Reid, S. Kelley and L. C. Harden of the Four Hills mine, and T. T. Hughes of Downville, have leased the Four Hills drift mine from the Hughes estate for one year and will prospect for a back channel supposed to exist on the property.

SISKIYOU COUNTY.

The Pinch Creek mine near Yreka has been put in shape for working by D. McCook. This mine is owned by A. E. Raynes, R. H. DeWitt, J. F. Farraher and D. McCook of Yreka, who intend working it, milling the ore in the McCook mill.

The Sheba quartz mine at Patterson creek, in Scott valley, has been started up. This mine paid well when first opened, and encouraged the owners to erect a fine mill, with hoisting apparatus and other modern machinery.

The Oregon & California mine on Klamath river, 4 miles below Klamathon, has been bought by C. W. Tyrer of Siskiyou county, H. B. Kelly and G. B. Goodell of Portland, Or., for \$10,000. A 5-stamp mill is on the mine. The development work consists of 500 feet of tunneling and a 350-foot shaft. The new owners will operate the property on an extensive scale. They have bought the machinery on the old Eureka tellurium mine near Redding from the Eureka Tellurium M. Co. of San Francisco, and are having it removed to their mine near Klamathon.

TRINITY COUNTY.

G. L. Bailey of Weaverville says that at the Chloride mine at Dedrick the ledge has been tapped at a depth of 700 feet larger and richer than ever. The mill is running steadily on good ore and gold cleanups are regularly made.

At the Mason & Thayer mine at Dedrick a force of men are at work and the ledge is strong and rich.

Noble Bros. have struck promising quartz on their claim at New River, which is now bonded by people who have taken about a ton of the quartz to San Francisco to be milled. It is said that the ledge is about 8 feet wide.

The Sweetstake G. M. Co. has bought the Hupp & McMurray gravel mines at Weaverville, which have produced more than a million dollars. The mines consist of 1000 acres of gravel, which have been worked for forty-two years. Hupp Bros. have been placed in charge as Supts. The force has been increased to thirty men, working day and night. Flumes and ditches are being enlarged, an electric light plant is to be put in, and also a water power cable system.

TUOLUMNE COUNTY.

A \$1000 payment has been made on the Porto Fino to J. H. West of Soulsbyville. A steam hoist was recently placed upon this property and the old shaft cleaned out and retimbered.

At the Draper sinking continues, the shaft now being 480 feet in depth.

The owners of the Black Oak mine are having a ditch constructed from Arrastraville to the mine.

The air compressor at the Street mine, Tuttle town, is in successful operation. Grading for a 5 stamp mill to be operated by water power from Frietas ditch, is under way. The veins are narrow but high grade. At present the shaft is 300 feet deep.

M. Tate, J. R. Ryland and L. C. Traller of Santa Clara county, have sold the Rising Sun, Fairview, Last Chance and Pearl mining claims, situated above Arrastraville, to the Blue Slate M. & M. Co. for \$80,000.

The old shaft on the Wild Cat mine, at

Sonora, has been discovered by sinking 20 feet. The timbers were found to be in good condition. The property is under bond to E. DeHaven from P. B. Bacon.

The Keltz mine, at Sonora, has resumed operations under the superintendency of Mr. Knox, formerly of the Riverside mine. The property was recently bonded to San Francisco people.

COLORADO.

BOULDER COUNTY.

A strike has been made in the Silent Friend mine at Ward of a large body of first-class ore. The strike is in the 600-foot level of a 28-inch wide streak of ore of which 8 inches is smelting grade which will average \$50 per ton, and 2 feet is first-class mill ore. This mine is owned by the Welcome G. M. & M. Co., with G. L. Spence as general manager.

CLEAR CREEK COUNTY.

The Gold Anchor mine, under bond to T. Slater for \$14,000, has been bought by the Gold Anchor M. Co., composed of Indiana capitalists, and the bond paid off. T. Slater will be the manager. Machinery will be placed on the mine.

GILPIN COUNTY.

Colorado and Eastern men are trying to effect a consolidation of the Klondike, Linden Castle, Texas, Mahaska, Democrat, Coaley and Gilpin silver-bearing veins, situated on the mountain dividing Four Mile and Silver gulches, near Blackhawk, for development under one management.

Sinking is being done at the Carr mine. Manager S. Hoskin says about 4½ feet per day is being made. The shaft is now down 700 feet and will be continued to a depth of 2000 feet. The work is principally development. The terminals of the aerial tramway have been completed. This tramway is intended to convey the ore from the Carr mine to the Randolph mill at Black Hawk, and also to convey coal and water from the mill to the mine.

GUNNISON COUNTY.

The Grafflin M. Co. is operating the Iron Cap mine at Spencer and is said to be intending to immediately equip it with a plant of stamp milling machinery and necessary buildings.

HINDSdale COUNTY.

(Special Correspondence).—At the Hidden Treasure, located near Lake City, the mill is not being operated at present, but extensive development work is being done in the mine. At the upper terminal of the tram line the main shaft has been sunk about 1000 feet on the ledge and is to be sunk 200 feet deeper to the level of the Ute tunnel, to make a ventilation connection for the mine. Six levels have been run on the vein from the main shaft, each from 700 to 1000 feet, with considerable stoping. The main vein follows the alignment of the mountains from northeast to southwest. A new tunnel has been started near the mill which is calculated to cut the ore body at 3800 feet from the tunnel entrance and 1700 feet below the surface. The work has progressed 300 feet. The Hidden Treasure ores are sulphides. The sorted ores and concentrates run 62% to 65% lead, 15 ounces to 20 ounces silver, 1½% iron, a small per cent of zinc and small values in gold. In concentrating the mill makes jig and table products, most of the gold going out with the zinc slimes which are not saved. Supt. P. C. McCarthy states that the mine contains one block of ore 350 feet long, 140 feet high, with the vein 3 to 4 feet wide.

Lake City, Sept. 8.

LAKE COUNTY.

The old Harrison reduction works, owned by the St. Louis S. & R. Co., idle for a number of years, has been leased to be made into a smelting plant for the treatment of low-grade ores of the Leadville district. The New Jersey G. & C. R. Co. is the operating company, of which J. A. Jeannotte is president, C. A. Miller manager and E. V. Hoagland secretary. A great deal of machinery will have to be replaced by more modern types.

A strike is reported from the 500-foot level in the Cloud City mine at Leadville of carbonate ore carrying good values in silver and some gold. The property is owned by the Cloud City M. Co., W. F. Jones, manager.

The mines of Leadville district produced 70,000 tons of shipping ore in August. Of this the American S. & R. Co. bought 61,000 tons, the balance being consigned to the zinc smelters in Missouri, Kansas and Wisconsin. This large aggregate represents only the amount that the market can handle of the classes of mineral produced in the district. The restriction is accounted for by the limited facilities of the smelters for calcining or roasting sulphides. The amount they are using represents their utmost present capacity for the classes mentioned, but if the capacity of roasting furnaces and automatic machines could be increased

the production could be made equal to the increase of capacity.

OURAY COUNTY.

(Special Correspondence).—The Governor group, on Stoney mountain, is in charge of W. Billesbach. It contains two parallel veins, one carrying gold chiefly and the other silver. Development is through a tunnel that cuts the two veins. Besides this there is a considerable amount of drifting. The gold ore mined is a white quartz, carrying some tellurium, iron sulphides, with silver and gold. The silver-bearing vein carries lead and iron sulphides, with some seams of ruby silver. Shipments of the higher grades are being made. An air compressor of the Leyner type is being installed. There is a large tonnage of mill ore on the dump and much more of the same grade seems to be in sight. The erection of a concentrating mill is contemplated.

At the foot of Yankee Boy basin is the Trust-Ruby mine and mill, the latter not being operated at present. The property has two tunnels, the upper in 300 feet, the lower 1500 feet, both on the vein. The two are connected underground. A small force is at work, in charge of John Wahl. The ores are a copper, iron and lead sulphide.

Farther up toward the head of Yankee Boy basin, almost at the foot of Mt. Sneffels, is the Altoona group, which is being developed under the management of J. D. Spalding. Present work comprises three tunnels and shaft. The ores consist of an iron and lead sulphide, the chief values being in silver. The quartz gangue carries some fine specimens of ruby silver and gray copper. The hoist is operated by a gasoline engine. A second gasoline engine operates an electric generator, which furnishes power for two Durkee drills. Buildings are being erected so as to operate all through the winter.

Sneffels, Sept. 5.

SAGUACHE COUNTY.

C. R. Gehl, L. L. May and O. Taubert of St. Paul, Minn., have bought the Evening Star mine at Alder and are developing it. The vein is over 20 feet wide and shows good values in silver, lead and some gold. It has a tunnel in 300 feet. The company is erecting buildings and will install a steam plant at once.

The Breck M., M. & T. Co. has been incorporated by Denver people, headed by H. D. McMasters, to mine 125 acres of land near Villa Grove. There are three shafts on the property. The last shipments of ore showed values of \$74 to the ton—50% lead, forty-five ounces silver and about one-half ounce in gold to the ton. The company proposes to run a tunnel 500 feet, which is expected to cut six veins.

SAN JUAN COUNTY.

(Special Correspondence).—The Eureka Exploration Co.—Colorado and Iowa people—own the Ridgeway, in Maggie gulch; the Silver Wing, on the Animas, 2 miles above Eureka, and the Frederica, in Burns' gulch, on the opposite side of the Animas from Picayune gulch. The Silver Wing and Frederica are to be operated through the same tunnel, now in 1700 feet, which will be driven 3000 feet farther, cutting through the Silver Wing grounds into the Frederica. It will cut the latter at 1550 feet depth. The Frederica is now fairly well opened through three levels, the highest and lowest being a vertical distance of 300 feet apart. Near the entrance to the Silver Wing tunnel is a concentrating mill which is being put in condition to operate. The ores of this group carry a silver-lead galena, with a considerable percentage of pyrite. The company is putting in a pipe line on the Animas river to supply water power for mill work.

The Ridgeway is considerably opened up through two levels and produces gold and silver-bearing quartz that is said to carry petzite as one of its mineral species.

This company also operate the Scotia, in Picayune gulch, as lessees. This mine has produced, perhaps, \$75,000.

J. H. Morel and E. C. Van Deist are most active in the management of the Eureka Exploration Co.

The San Juan Queen, in Picayune, is near the Scotia and is being developed by Rasmus Hanson and a Mr. Usher. It comprises eight or ten claims, and present showing is an iron sulphide running well in gold and silver. There are specimens containing native silver.

Additional water power has lately been added to the Sunnyside mill. The plant now comprises two pipe lines—one taking water from the Animas river and the other from Eureka creek. The Animas line consists of 7000 feet of 14-inch pipe; the Eureka line comprises 4000 feet of same diameter. The two heads of water develop 700 H. P. by two Pelton wheels at the mill.

The Eureka line drives all the mill machinery; the Animas line drives an electric generator for light and Durkee

electric drills shortly to be put in at the mines.

The twenty stamps, with amalgamating plates, concentrators and canvas tables, handle over sixty tons of ore daily. The mill capacity is to be doubled by adding twenty more stamps and appurtenant equipment. The ores of the Sunnyside carry some free gold, and gold, lead and silver in zinc, lead and iron sulphides. They are not very siliceous and make a fairly clean concentrate. The material passes from the stamps over the plates, thence over Bartlett tables, thence over Wilfleys, and the final tailings over canvas tables. In this course no attempt is made to classify the material, but it passes as one uniform grade through the mill.

Eureka, Aug. 26.

SAN MIGUEL COUNTY.

(Special Correspondence).—The Ophir Con. M. Co., made up largely of Milwaukee stockholders, own the Silver Bell mine, including forty-five claims at Ophir on the Rio Grande Southern R. R. W. S. Buckley of Telluride is general manager. The mine is opened through four tunnels in the vein. At a point near the railroad, 1900 feet from the mine, a concentrating mill is being completed. It has twenty stamps, four Wilfleys and six Frue vanners. The material will pass from the stamps direct to the Wilfleys which will make a heavy lead product, the tailings being lifted by a sand pump to Spitzkasteus where they are sized for the vanners, the latter making the lighter product containing the iron and copper. The lead and iron carry gold, silver and lead values. The iron will run about 11%, copper 1½%, and silicates 50% to 60%. W. H. Major has charge of the mill and Jas. McWilliams the mine.

The Butterfly-Terrill works about seventy men at the mine and six in their 30-stamp mill. The latter turns out bullion and concentrates. A late cleanup of the former from the plates after a two weeks' run amounted to about \$6500. D. J. Sayer is the manager and J. Nevin millman.

Ames, Sept. 2.

(Special Correspondence).—The Smuggler-Union mills at Pandora comprise the reconstructed Pandora mill of eighty stamps, the new Smuggler of sixty stamps and the cyanide plant, almost completed, to treat the tailings from both the stamp mills.

The Pandora, which has been equipped with new machinery, is now similar to the new Smuggler mill in the method of operating. The equipment comprises stamps, plates, bumping tables, Triumph vanners, Huntingtons and sizers. The main product comes off the bump tables, the tailings therefrom passing to the vanners. The vanner tailings go through sizers to the grinders, thence to Frue vanners. Fifty of the eighty Pandora stamps will operate on the Smuggler-Union ore, the remaining thirty handling the ore from the Contention group, up Bear creek, which belongs to the same company. A tramway is being built from the latter group to the mill. S. T. Elliott, superintendent of the Pandora mill, states that he will soon be handling 130 tons per day of Contention ore, which is quite free milling, being very siliceous and carrying little iron. The Pandora mill is run by electric power.

In the new Smuggler mill the crushed ore, after passing over the plates, falls upon a screen over each bumping table. The oversize passes to Wilfley tables, thence through Chilian mills, over amalgamating plates and then to vanners. That which passes the bump table screens makes the heavy concentrate of the mill, the tailings being carried to the thirty-two vanners on the lower floor, where the finer product is made.

The new cyanide plant, being constructed under the directions of F. L. Bosqui, is enclosed in a building 94x248 feet, wood frame with double truss roof, and siding and roof of corrugated iron. The foundation walls amount to 16,000 cubic feet of masonry. A V-shaped stone sluiceway runs lengthwise through the center, which is 1 foot deep at the upper and 9½ feet deep at the lower end. This will carry away the refuse from the leaching vats. There will be sixteen leaching vats, 8½x40 feet, and two solution tanks, 11x40 feet, giving the plant a leaching capacity of 600 tons in twenty-four hours. The vats, which are built of redwood, are being arranged in a double row on each side of the sluiceway to provide for the double treatment. The upper tier of vats receives the tailings from both mills through automatic distributors, where they are subjected to a short treatment. While the heavier material is settling in the upper vats there is a constant overflow through top gates of slimes which pass to canvas tables, the precipitant on the latter being afterward cyanided. The material in upper vats is dropped through

eight discharge gates in the bottom into the lower vats, where the leaching is finished. The five zinc precipitating boxes are each 24 feet long, 4 feet wide and 3 feet deep. The slimes that come from the mills are estimated to contain gold and silver to the value of \$2 to \$2.50 a ton.

C. W. Van Law, general mill superintendent, is also directing the construction of this company's Contention mill near Silverton.

Telluride, Sept. 3.

TELLURIDE COUNTY.

G. Schlifer of Cripple Creek is owner of the Scottish Chief and other claims near Love, on which a strike is reported that will run \$45 in gold to the ton. At a depth of a few feet a 3-inch shoot was opened and at 40 feet it has a width of 3 feet.

IDAHO.

BLAINE COUNTY.

Fifteen men are employed at the Gladiator and Senate mines, near Galena. A gasoline engine runs a fan to ventilate the 1500 to 1800 feet of tunnel and drifts. In the 750-foot drift two crosscuts 450 feet apart show an ore vein of 15 feet width of concentrating ore, some of which carries 150 ounces silver to the ton.

The Pennsylvania Dev. Co., operating at the Liberal and Maggie May group of mines, has taken up its option on C. W. Courtney's interest, and is now sole owner. Mr. Courtney is continued as superintendent.

IDAHO COUNTY.

A. Arnold, of Pierce City, has sold his half interest in the Fleetwood mine at Pierce City to J. Coach of Port Huron, Mich., who already owned the other half. The mine has been developed to a depth of 250 feet.

At the Dewey mine, Thunder mountain, the tunnel has been driven 300 feet, and the ore, a soft porphyritic material, is the same as at the surface. A crosscut has been run 50 feet in ore that the surface showing indicates has a width of several hundred feet.

A. Kleinsmith, one of the owners of the Old Peacock, White Monument, Helena and other properties in the Seven Devils, it is said, has started a tunnel from the river intended to open up the Peacock mine, 3 miles back from the river, and about 5000 feet above the river bed. The claims are now under bond to the Boston & Seven Devils Co.

Thunder mountain, just now attracting miners and prospectors because of gold discoveries made on it during the past few years, is claimed to be a mountain of ore. It is said that every foot of its surface will pan colors, while within a radius of 50 miles from the original discovery there are many gold-bearing ledges. Placer propositions are numerous, water abundant and the country heavily timbered. As a general thing the ore bodies are low grade, but of free milling character. The importance given to discoveries in this district is because of the immensity of the deposits and the cheapness with which the ore can be mined and milled. Thunder mountain is about 100 miles north and a little east of Boise, and it is proposed to build a State wagon road from that city to the new camp, the cost of which is estimated at \$20,000. Arrangements are being made for the extensive development and operation of some of the most promising prospects and mines.

The Tahoma mine, at Atlanta, has been sold to the Golden Age M. Co., with office in Boise. F. P. Willis has been appointed Supt. A 20-stamp mill will be put on the property this fall, if it is possible to get it in before bad weather begins. The Tahoma has been developed by four tunnels. The lowest one tapped the ledge 400 feet deep and is 1200 feet long. The ore body averages 8 feet wide and, it is claimed, carries values of \$55 a ton gold and \$20 silver.

KOOTENAI COUNTY.

The Weber mine and mill on Lake Pend d'Oreille, owned by F. A. Weber, S. P. Donnelly and A. B. Campbell of Spokane, Wash., is being reopened, and the mill is to be used as a concentrator until some changes are made.

R. Neill, of the placers at Santa camp, near Tyson, says: "There are at present upward of 200 people working at placer mining at Santa and doing well."

LATAH COUNTY.

The White Cross M. Co., of Moscow, have ordered a 5-stamp mill, which it is expected will be placed on the mine ready to start by the last of September.

MICHIGAN.

BOUGHTON COUNTY.

The copper output of the Lake Superior district for the past three years is in pounds as follows:

| | |
|-----------|-------------|
| 1900..... | 148,000,000 |
| 1899..... | 146,950,000 |
| 1898..... | 147,966,000 |

The following is a list of the Lake mines

and the number of stamps that have recently been started and those that will start within the next twelve months: Adventure, 3; Baltic, 2; Champion, 2; Franklin, 3; Isle Royale, 3; Maas, 3; Mohawk, 2; Osceola, 3; Quincy, 3; Trimountain, 2; Wolverine, 2; total, 28. These 28 stamps have each a capacity of 500 tons of rock daily. In 300 days they will be able to stamp 4,200,000 tons of rock, and if it averages to contain 1% copper the aggregate increase in the production will amount to 84,000,000 pounds annually, with allowances for delays and disappointments, but it would seem reasonable to expect in 1902 an increase of 50,000,000 pounds of copper from the Lake region.

MONTANA.

BEAVERHEAD COUNTY.

T. H. Landers and his associates have leased the Golden Era at Argenta and expect to put men at work cleaning out the workings and reopening the mine. The mine has been developed by a shaft 300 feet in depth and a drift 300 feet at the bottom.

FERGUS COUNTY.

The final payment of over \$300,000 on the Kendall gold mine has been made by Finch & Campbell. A tunnel has been run in under the deposit for a distance of 700 feet. Crosscuts show the average width of the vein to be 135 feet. Upraises and winzes have developed the ore body to a depth of 60 feet at the beginning and 250 feet at the further end of the tunnel. The true extent of the ore body cannot be determined as yet, but upwards of a million tons of ore that will average about \$9 per ton are already blocked out. H. Kendall, who receives \$450,000 for the mine and a tenth of the stock in the new company, bought the mine two years ago for \$650, of which he paid \$50 in cash. He took out over \$100,000 before he sold the mine. The expense of mining and milling the ore when the new plant is erected will not exceed \$1.50 per ton.

JEFFERSON COUNTY.

A 35-foot wide ledge of ore has been discovered at Corbin by M. Mulvahl near the old Alta mine. The assays show 11% copper, 30 ounces of silver, 7% lead and \$2.20 in gold.

LEWIS AND CLARKE COUNTY.

A. W. Martin of Helena, owning in the Argo and Canyon Ferry copper mines, near Helena, says his people are about to put in a large treatment plant of their own.

MADISON COUNTY.

The Golden Wedge on Wisconsin creek, at Twin Bridges, was discovered two years ago by the present owners, Hyndman & Haynes. The lead is 2 feet wide between lime and quartzite walls. Ten inches of the quartz is decomposed. Assays vary from \$100 to \$250.

NEVADA.

ELKO COUNTY.

The Contact Copper M. Co. has been incorporated at Salt Lake City, Utah, capital \$40,000. W. C. Coleman is president and H. A. Mercer secretary and treasurer. The company owns the Sulphide mining claims Nos. 1 to 4 in the Little Salmon River mining district.

EUREKA COUNTY.

The Stoddard Bros. have completed the cyanide plant and now have it in successful operation on the Eureka Con. mill site at Eureka. It treats between fifty and sixty tons of ore per week, and ores from the Barton and Cyanide mines on Adams hill and the old Lemon mill tailings are being worked.

LYON COUNTY.

The Lizard mine, near Sutro, has been bonded by San Francisco people. A mill test of the ore gave results so satisfactory that it has been decided to erect a mill at the mine. The formation is decomposed quartz assaying \$10 per ton in gold. It is very soft ground and can be quarried.

NYE COUNTY.

It is reported that the O'Meara lease on the Mispah lode at Tonopah has already produced ores of the value of \$100,000, and promises to add \$200,000 more before it expires. On the Mispah, the pioneer ledge, the ore body is opened up continuously for 1100 feet by shafts varying from 50 to 120 feet in depth, and through drifts that follow a continuous body of high-grade ore. In this stretch are fourteen leases in operation, all ending December 31. The lessees are subordinating extraction to the opening up of the ledge and blocking out ore so that the raising of ore may proceed night and day toward the end of the time limit.

President Anderson of the Tonopah mine, at Butler, says that oral bargains are the only ones made with leasers and witnesses are not necessary. Although there are dozens of leases given to the tributaries, there is not a scratch of the pen

between the company and the leasers. The company receives 25% of the net proceeds, and this sum amounts to \$5000 a day. These leases expire on the last day of December, after which the company will take charge. Two triple-compartment shafts will be sunk immediately to a depth of at least 500 feet. They will be situated 2100 feet apart, where they will cut all the ledges by crosscutting toward each other. At present the company is working the Clark shaft, which is down over 100 feet, and shows 7 feet of ore averaging \$1000 a ton. Every foot of depth brings \$400 to the surface.

WASHOE COUNTY.

(Special Correspondence).—The gross production of the Reno Star mine, at Reno, owned by the Sparks M. Co., is about \$125,000. Nothing less than hundred-dollar is shipped, and at present from one to three carloads are shipped every week. There is over 1000 tons of ore on the dumps, the estimated value of which is over \$80 a ton. As soon as pending litigation is settled, a plant for working the ores at the mine will be installed. A steam hoist, capable of sinking a double-compartment shaft 600 feet, and a Dow sinking pump have just been put in place. The ore body is claimed to be holding its values with depth. The shaft is now down 150 feet.

Over 500 mining claims have been recorded at Reno since Wedekind's discovery of the Reno Star in June, 1900, and a great deal of development work has been done, resulting in the discovery of many promising leads. Many efforts have been made to trace the supposed course of the Wedekind ore body for considerable distances and several shafts have been sunk, but the existence of this lode beyond the limits of the Wedekind claim must still be regarded hypothetical. On the other hand, prospecting for separate deposits has been well rewarded. Practically all formations showing on the surface are of eruptive origin, the primitive rock being covered to varying depths by the superimposed porphyries and quartzites. Through this surface formation rise pipes of extinct thermal springs. Some of these pipes are so highly impregnated with metal deposited from solutions as to be ore chimneys. This is particularly the case where the pipes rise within an otherwise barren ledge, ore shoots being thus produced. These pipes vary in size and are extremely irregular in course, rendering much ingenuity and perseverance necessary in prospecting them. For this reason vertical shafts on these pipes have not been successful. The values found in these shoots are principally silver and lead—the former frequently occurring in gray and yellow chlorides and sulphides, while the lead is found as sulphide and carbonate, carrying good values in silver. Gold is generally present to about 5% proportion of the total value.

An important change of formation which occurs 3 miles north of the town of Reno marks a transition from the silver and lead bodies of the distinctly eruptive country to the copper and gold prospects of Peavine mountain. Granite, syenite, slate and lime replace the porphyries, the line of contact being in some places well defined and productive of valuable ore bodies. Practically, no copper has been found south of this dividing line. North of the line it occurs as carbonate, bornite, sulphate and oxide, with occasional pockets of native copper. Some silver and a little gold is always associated with the copper.

Ramsey's Tally-ho claim, an adjoining prospect to the Wedekind mine, has one 80-foot and one 40-foot shaft, with ore that averages about \$4 in gold and silver. It presents the same surface characteristics.

North of the Wedekind mine about 1 mile is the Crevesser M. Co.'s property. The owners are Lynch, Cohn, Dysart, Tibbets, Rulison and Grant of Reno, who have a shaft down over 100 feet.

The Reno Chance M. Co., R. Eason president, G. W. Perkins secretary and C. Frisch treasurer, is a Reno company which is developing a mine near the Wedekind. A shaft is down 115 feet and shafts will soon be sunk on other lode outcrops.

Two miles north of Reno, W. R. Williams and A. Nelson of Reno have recently discovered a shoot of ore carrying high values in lead and silver. Development is being done by an incline now 60 feet down. The ledge is persistent and ore increases in value with depth.

On the Southern Star claim of Redman & Richardson a ledge carrying silver and lead, the latter as red oxide, has been struck.

Thompson & Frey, on the Rubicon, have a ledge 4 feet wide which at 20 feet depth averages \$8. They are now down 30 feet. Lynch & Bryson are working the Flyer claim. J. L. Simpson is working on the Wild Eye, in which he has bought an interest. Holesworth & Burk

are prospecting the New York and New Jersey claims, 1 mile from the Williams & Nelson property.

Reno, Sept. 6.

M. Sheeline, A. G. Fletcher and Mrs. A. E. Osborn and associates of Reno have bonded to the Senator G. M. Co. at \$50,000, for two years, 120 acres of mineral land at Steamboat Springs. The Senator Co. have deposited \$5000 as security for continuous work. Mr. Ogden has been appointed as superintendent. The theory of the company is that a large quartz ledge of great richness underlies the deposits of the geysers. The formation has been cut on an adjoining claim with a diamond drill and assays of borings yielded from \$1700 to over \$4000 in gold. A double-compartment shaft is now being sunk.

Supt. A. E. Murdock of the Last Chance mine says that the incline is down over 190 feet, all in ore. A new incline will be made some distance away and a connection run to the present workings to supply air and determine the extent of the pay shoot.

At the Black Horse mine at Cambridge Mr. Deitrich is completing the construction of the 2-stamp mill and expects soon to be operating it.

The Monte Carlo mine is 3 miles east of Washoe City, and rich copper ore has been struck. C. F. Mickall is Supt.

C. E. White of Philadelphia, Pa., and H. H. Barbee of Colorado Springs, Colo., have taken an option on the plant of the Reno M. & S. Co. at Reno, and expect to buy it and have the smelter running within sixty days.

NEW MEXICO.

GRANT COUNTY.

T. W. Carter is driving a 100-foot tunnel on his Copper Jacket claim at Burros, and expects to cut the vein, which has good surface cropping at the 100-foot depth.

R. P. Thompson and B. F. Copp have an 18-inch vein of ore on their Virginia mine at Burros, at a depth of 70 feet, that they claim runs 25% copper.

E. G. Maroney, D. Shay and J. H. Bates have sold the Irish Gray, Bison, Treasure and Fortune at Burros to Silver City parties. All of the claims show good surface croppings of copper ore, and the new owners expect to commence development work at once.

LINCOLN COUNTY.

A San Antonio, Texas, company has bought twenty-three copper claims near Estey City, in the Oscura mountains, and is putting machinery on them.

New machinery is being installed in the Turkey Creek mines, near Nogal, and the owners, the Iowa & New Mexico D. Co., intend to do considerable development work.

Three Nogal men have bought the Parsons mine at Nogal for \$10,000. A mountain of free milling low-grade gold ore is included in the twenty-five claims. The new owners expect to put in a plant that will save the values at low cost.

OREGON.

BAKER COUNTY.

It is stated that the Bonanza mine, near Baker City, is to have a plant with a capacity for sinking a triple-compartment shaft 2500 feet.

GRANT COUNTY.

The owners of the Cougar, near Granite, have incorporated with an office at Spokane, Wash., to operate the mine, which includes four claims. There is a long tunnel of 1000 feet along the vein and considerable surface work has been done. The mill has a capacity of 250 tons daily, but does not work satisfactorily. D. R. Evans, president, says that the company will put in a roasting plant. H. D. Crow is secretary and J. W. Larkin is manager.

It is reported that the Virtue mine and the Con. Virginia, near Baker City, owned by D. Keith of Salt Lake City, Utah, are to be consolidated under one management. Recently a pocket was opened up in the Virtue which was about half gold.

JACKSON COUNTY.

Miller & McDonald, who have bonded the Cox & Lyman ledge, situated near Gold Hill, have made another rich strike, and a large amount of gold has already been taken out.

JOSEPHINE COUNTY.

The Lucky Cuss mine of the Williams Creek district, near Grants Pass, has been bonded by McCann & Strickland. The new company proposes to work the mine on a larger scale than heretofore.

UTAH.

BEAVER COUNTY.

The B. W. & H. G. & S. M. Co. has been incorporated at Richfield; capital, \$100,000; J. M. Billingsly is president and J. H. Wells secretary and treasurer. Joseph is the principal place of business.

BOX ELDER COUNTY.

The Dove Creek M. & M. Co. has been incorporated, capital \$40,000. The company owns the Manchester, London and other mining claims at Dove creek. L. H. Young is president and J. A. Young secretary and treasurer.

The Deer Trail G. M. & M. Co. has been incorporated at Salt Lake City, capital \$30,000; H. Denhalter is president and C. H. Hipp secretary and treasurer. The company owns the Denhalter and five other mining claims in Park valley.

PIUTE COUNTY.

The Adelborn M. Co. has been incorporated at Salt Lake City; capital, \$15,000; C. H. Scott is president, B. B. Corbin secretary and treasurer, and B. T. Ashley Supt. The company owns the Last Dollar and twelve other mining claims in the Mount Baldy mining district.

SALT LAKE COUNTY.

The Bingham C. & G. M. Co., known as the Commercial group of Bingham, are to be opened by a new tunnel 1700 feet long. O. P. Posey, manager of the company, has called for bids on the work.

SEVIER COUNTY.

A deposit of kaolin, near Glenwood, is being investigated. It is owned by H. J. Gottfredson, C. J. Hansen and J. Crosier of Richfield.

TOOELE COUNTY.

The Don Pedro M. & M. Co. has been incorporated, capital \$5000. J. H. Palmer is president and L. F. Peer secretary and treasurer. The company owns the Ute and five other mining claims in Rush valley.

WASHINGTON.

FERRY COUNTY.

J. Cronin, operating the Phil Sheridan mine at Sheridan, near Republic, says that the first shipment sent to the smelter from the mine yielded \$100 per ton in silver and gold, but the cost of the wagon haul, smelter charges and other expenses left only a profit of \$30 per ton. The ore can be treated on the ground for about the present smelter charges.

There are 3 feet of ore assaying from \$25 to \$35 per ton in the 40-foot deep winze sunk from the Great Republic tunnel. The Great Republic is on the west slope of Malde mountain, 1500 feet south of the international boundary line. The mouth of the tunnel is 30 feet above and less than 100 feet distant from a railroad track. The mine was first located in 1894 by C. C. Knutson and R. Malde of Roseland, B. C., who recorded it in Roseland, supposing it to be in British Columbia.

The shaft of the Trade Dollar at Republic has been sunk 210 feet. The ore body is about 3½ feet wide. The ore is of shipping grade.

Supt. W. M. Crummer of the Gold Ledge mine says he has let a contract to drive the tunnel on that property a further distance of 325 feet. The plan is to cut the ledge at a depth of about 350 feet.

WYOMING.

ALBANY COUNTY.

A. F. Whitman has discovered near his copper mine in Plumbago canyon, 30 miles north of Laramie, a deposit of asbestos. The vein he states to be 10 feet in thickness and free from mica. Denver people are negotiating with Mr. Whitman to develop the property for a share of the output.

FOREIGN.

BRITISH COLUMBIA.

The Prospectors' Exchange of Nelson says: The Vicking M. & Dev. Co. have bonded the Phoenix group, Slocan, and will start operations on an extensive scale.

The last shipment of thirty-three tons of Wonderful ore, Slocan, averaged \$80 per ton.

The Hewitt mine, Silverton, is shipping about 100 tons of dry silver ore per week, running from 100 to 150 ounces in silver and from 1% to 5% lead. The mine is now opened to a depth of 450 feet. A 1000-foot tunnel, now in 350 feet, when completed will enter the ore bodies at a depth of 900 feet.

A strike has been made on the Fisher Maiden at Silverton of 8 feet of dry ore, running 125 ounces silver to the ton.

H. Eller and D. Munroe have made a strike of gold quartz on the Follow Me group, Fort Steele district. The ledge is from 40 to 50 feet wide, lying between walls of slate and syenite, and shows free gold.

Nelson, Sept. 5.

The Relief G. M. Co., capital \$250,000, has been incorporated at Spokane, Wash., by J. A. Finch, A. B. Campbell, R. K. Neill of Spokane, B. Todd of Youngstown, Ohio, and H. Wick of New York. Mr. Campbell states that they have incorporated the old Relief mine, 13 miles from Erie, of which they had been trustees for a number of years. The stamp mill under construction will be completed

and running in about three weeks. This mine is a free-milling proposition.

The Hartford M. Co., capital \$900,000, has been incorporated at Grand Forks to operate the Hartford fraction, Ranger, Nabob fraction, Golden Eagle fraction and Golden Crown fraction, all of which are situated in Wellington camp. The provisional directors are S. H. C. Miner, J. H. McKechnie, Granby, Que.; A. C. Flumerfelt, H. N. Galer, Grand Forks; A. L. White, D. Louson and W. A. Matley, Montreal. Thus far about \$12,000 have been expended in development work. A shaft 100 feet deep and a drift 125 feet long are all in ore on the Hartford claim.

Personal.

S. WRIGHT of Virginia City, Nev., is at Signal, Ariz.

HENRY BRATNOBER, of London, is in San Francisco.

M. CURRAN has been appointed Supt. Alice mine, at Wallace, Idaho.

A. D. GASSOWAY of North Bloomfield, Cal., is sojourning in San Francisco.

VICTOR M. CLEMENT has returned from Mexico to Salt Lake City, Utah.

H. MURRAY is manager of the Dudley drift mine at Forest, Sierra county, Cal.

S. T. PEARSON has been appointed manager of the Nevada Co. at Austin, Nev.

O. COFLIN has been appointed superintendent of the Green Mountain mine at Grass Valley, Cal.

L. D. BALL, superintendent of the Yreka M. & M. Co. at Sawyers Bar, Cal., is in San Francisco.

B. F. JAMES of Oakland, Cal., has returned from quartz mining operations in Ecuador, South America.

G. W. TIBBITS of Denver, Colo., was at Gila, Cal., for some days last week examining mines at that place.

R. M. CATLIN, general manager of the Transvaal mines of the Consolidated Gold Co. of London, is in San Francisco.

M. GALLAGHER, Boise City, Idaho, has been appointed superintendent of the Oriental M. Co., operating in Korea.

A. FLOOD, formerly of Virginia City, Nev., has been appointed superintendent of the O'Farrell cyanide mill at Missoula, Mont.

H. L. HUSTON has gone to Mexico to develop some copper claims near Hermosillo, Sonora, for Benjamin, Meredith & Wynne.

F. P. WILLIS of Boise has been appointed superintendent of the Tahoma mine, owned by the Golden Age M. Co. at Atlanta, Ida.

Commercial Paragraphs.

THE Calumet & Hecla Copper M. Co., the largest copper mining company in the world, have ten Cross oil filters in successful use in their mines. They were furnished by the Burt Mfg. Co. of Akron, O.

THE 60-page illustrated catalogue published by the Smooth-On Mfg. Co. is interesting and instructive. It tells all about different Smooth-On cements, what Smooth-On is, how used, gives illustrations of its use and tells why it is valuable to the engineer, machinist, iron and steel founder, steam fitter and plumber. Send for a copy to 34-36 Steuart St., San Francisco.

THE contract for the ten large Corliss engines to furnish electric power to the Subway Railway in New York City has been awarded to the Allis-Chalmers Co., and will be built by the E. P. Allis branch at Milwaukee. These engines are to be of the combined horizontal and vertical type, and are rated at 8000 H. P. each at most economical point of cut-off. They are pronounced capable of operating continuously under a load of 12,000 H. P. each.

Recently Declared Mining Dividends.

| | Payable. |
|------------------------------------------------------------------|----------|
| Jamison M. Co., Cal., 3 cents per share, \$11,700 | Sept. 23 |
| Empire State—Idaho M. Co., Idaho, monthly, 1 cent per share | Sept. 16 |
| Elkton Con. M. Co., Colo., quarterly, 3 cents per share | Sept. 20 |
| Uncle Sam M. Co., Utah, No. 1, 3 cents per share, \$15,000 | Sept. 16 |
| Daly-West S. M. Co., Utah, monthly, 35 cents per share, \$52,500 | Sept. 16 |
| Modoc G. M. Co., Colo., 3 cents per share, \$15,000 | Oct. 15 |
| Central Eureka G. M. Co., Cal., monthly, \$8000 | Sept. 12 |
| North Star M. Co., B. C., quarterly, 3 cents per share, \$39,000 | Sept. 16 |
| Smuggler M. Co., Colo., monthly, 3 cents per share, \$30,000 | Sept. 16 |
| U. S. Marble Co. Wash., monthly, ½ cent per share, \$15,000 | Oct. 15 |

| | R | S | T | U | V | W |
|--------------------------------------------|---|---|---|---|---|---|
| Rand Drill Co..... | | | | | | |
| Redington & Co..... | | | | | | |
| Roots Co., P. H. & F. M..... | | | | | | |
| Rose, I. Elmer..... | | | | | | |
| Richards, J. W..... | | | | | | |
| Ridison Iron Works..... | | | | | | |
| Riz Compressed Air & Ice Co..... | | | | | | |
| Robins Conveying Belt Co..... | | | | | | |
| Robinson, H. C..... | | | | | | |
| Roebbling's Sons Co., John A..... | | | | | | |
| Roesler & Hasslacher Chemical Co..... | | | | | | |
| Rosenberger, A. F..... | | | | | | |
| S | | | | | | |
| San Francisco Novelty & Plating Works..... | | | | | | |
| San Francisco Pioneer Screen Works..... | | | | | | |
| Sands & Wood..... | | | | | | |
| Saw, Ingram, Batchelor & Co..... | | | | | | |
| School of Practical Mining..... | | | | | | |
| Selby Smelting & Lead Co..... | | | | | | |
| S. H. Supply Co..... | | | | | | |
| Simonds, Ernest H..... | | | | | | |
| Simonds Saw Co..... | | | | | | |
| Situations Wanted..... | | | | | | |
| Smith & Co., F. L..... | | | | | | |
| Smith Co., S. Morgan..... | | | | | | |
| Smith & Co., Francis..... | | | | | | |
| Smith & Thompson..... | | | | | | |
| Smooth-On Mfg. Co..... | | | | | | |
| State Ore Sampling Co..... | | | | | | |
| Stevens, Ralph E..... | | | | | | |
| Stillwell, Bierce & Smith Vail Co..... | | | | | | |
| Strout & Son, W. H..... | | | | | | |
| Sturtevant Mill Co..... | | | | | | |
| Sullivan Machinery Co..... | | | | | | |
| T | | | | | | |
| Taylor Iron & Steel Co..... | | | | | | |
| Taylor & Co., P. T..... | | | | | | |
| Treadwell Iron Co..... | | | | | | |
| Tyler, S. W..... | | | | | | |
| U | | | | | | |
| Union Gas Engine Co..... | | | | | | |
| Union Iron Works..... | | | | | | |
| Union Photo-Engraving Co..... | | | | | | |
| V | | | | | | |
| Van Der Nellen, A..... | | | | | | |
| Van Wageningen, Theo. F..... | | | | | | |
| Vulcan Iron Works..... | | | | | | |
| W | | | | | | |
| Wanted..... | | | | | | |
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| Weber Gas & Gasoline Engine Co..... | | | | | | |
| Weigels Pipe Works..... | | | | | | |
| Western Chemical Co..... | | | | | | |
| Westinghouse Electric & Mfg. Co..... | | | | | | |
| Wetherill Separating Co..... | | | | | | |
| Wigmore & Sons, John..... | | | | | | |
| Wigmore & Sons, Milling Co..... | | | | | | |
| Wimmer, Geo..... | | | | | | |
| Wohler, Bartling Suc's..... | | | | | | |
| Wood, Henry E..... | | | | | | |
| Woodbury, Geo. E..... | | | | | | |
| Wright & Son, Geo. I..... | | | | | | |
| Y | | | | | | |
| Yawger, I. C..... | | | | | | |
| Yuba Con. Gold Mining Co..... | | | | | | |

SITUATIONS WANTED.

MILL BUILDER open for engagement on design or construction of stamp mill or concentrator. Technical education. Ten years' experience. Address S. T. F., this office.

WANTED.—Position with a dredge placer mining company who desire a practical dredge operator and machinist. Good references. Address J. D., care Mining and Scientific Press.

YOUNG GRADUATE MINING ENGINEER desires appointment as surveyor, assayer, or assistant to superintendent. Four years' experience in lead, tin, copper and gold mining. Good references. Apply L. T., this office.

WANTED.—A position as superintendent of quartz mine. Have had years of experience. Can do anything about a mine or mill. Know the value of a dollar in labor or material, with common sense to back me. No objections to go to South Africa, Corea or Mexico. Can give references. Address Box 30, this office.

WANTED.—Position as Manager or Superintendent of mining property in the United States or Mexico. Speak and write Spanish. Many years' experience and thoroughly practical. References. Address Box 237, Mining and Scientific Press office.

A Civil and Mining Engineer (member American Society of Civil Engineers, member American Institute of Mining Engineers), at present general manager of a Western gold mining company, desires change. Will go anywhere. Examining or reporting, exploration work or operating. Address Box 264, Grangeville, Idaho.

Mine Foreman or Superintendent.

Young man (32) with twelve years' practical experience in South Dakota, Arizona, California, Idaho and Montana; thorough knowledge of up-to-date mining methods and a fair technical education, desires position as mine foreman or superintendent. First-class references. Address "Cuprite," Box 1182, Butte, Mont.

MINING ENGINEER, graduate Mass. Inst. Tech., with thirteen years' experience as miner and surveyor for large copper company in Montana; superintendent of coal mine, washer and coke oven plant and railroad in South for six years; in charge of zinc property in Missouri; familiar with concentrating methods; at present in charge of cyanide operations of tailings pile in California, desires position with reliable company. Open for engagement after October 15. Address S. J. M., care Mining and Scientific Press.

SITUATION WANTED BY A YOUNG MAN with technical education and ten years' experience in Montana, California and Arizona. Was assistant superintendent in an Arizona copper camp and had charge of the bookkeeping, chemical work, assaying, purchasing of all supplies, and development work. Just resigned from charge of 20-stamp mill. Thoroughly understands cyaniding in San Francisco for a few days. Address L. E. P., care Mining and Scientific Press.

WANTED.

WANTED IMMEDIATELY FOR ARIZONA. COPPER BLAST FURNACE FOREMAN. Experience with Mexican labor necessary. Rate \$5 per day. Address "Matte," Mining and Scientific Press office.

WANTED.—Practical Mine Foreman for development work. New property on coast, S. E. Alaska. Must be all-round miner, tool sharpener, and perfectly sober. Go to opening for right man. Give experience, age, references, etc. Address "Foreman," care Mining and Scientific Press.

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Placer Ground of Every Description, with or without Water, and Gold-Bearing Beach Sands. Also Low-Grade Gold, Silver and Copper Property, whose values are difficult to extract. Address HEINTZ GOLD EXTRACTION CO., 417 Templeton Building, Salt Lake City, Utah.

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One thoroughly competent to take charge of a shop.

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are heavier than gold, tin-white and usually occur in small veins and do not amalgamate. They are valuable. Send for sale to Welsbach Company, Broad and Arch Sts., Philadelphia, Pa. Analysis free. For information concerning methods of saving the metals, write to the Waratah Minerals Company, Limited, 140 Ellis St., San Francisco, Cal.

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Free-milling Gold properties on very reasonable terms. Excellent chance for profitable investment in legitimate mining.

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We will purchase for cash if in good condition.

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ONE COMPLETE PLACER MINING DREDGE OF THE ELEVATOR TYPE.

With buckets having capacity of seven and a half cubic feet. Dredge only used few months. Located on Grasshopper creek, near Bannack, Mont. For full particulars, address THE BUCYRUS COMPANY, South Milwaukee, Wis.

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and CRANES of

The Risdon Iron Works,
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FOR SALE, FOR REMOVAL,

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Bargains in Water Wheels.
—WRITE THE—
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ASSESSMENT NOTICES.

MARIPOSA COMMERCIAL AND MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Mariposa County, California.

Notice is hereby given that, at a meeting of the Board of Directors, held on the 11th day of September, 1901, an assessment (No. 24) of Ten Dollars per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, Room 223 Crocker Building, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 21st day of October, 1901, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 11th day of November, 1901, to pay the delinquent assessment, together with the costs of advertising and expenses of sale. By order of the Board of Directors.

Office—Room 223 Crocker Building, San Francisco, California.

MARINA MARISCANO GOLD MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Sunny Hill, Shasta County, California.

Notice is hereby given that, at a meeting of the Board of Directors, held on the 7th day of September, 1901, an assessment (No. 25) of one (1) cent per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin to the secretary, at the office of the company, 217 Sacramento street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 14th day of October, 1901, will be delinquent and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 4th day of November, 1901, to pay the delinquent assessment, together with the costs of advertising and expenses of sale. By order of the Board of Directors.

Office—217 Sacramento street, San Francisco, California.

YUBA CONSOLIDATED GOLD MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Nevada County, California.

Notice is hereby given that, at a meeting of the Board of Directors, held on the 19th day of August, 1901, an assessment (No. 3) of three cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin to the secretary, at the office of the company, Room 301 Claus Spreckels Building, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 24th day of September, 1901, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 14th day of October, 1901, to pay the delinquent assessment, together with the costs of advertising and expenses of sale. By order of the Board of Directors.

Office—Room 301 Claus Spreckels Building, San Francisco, California.

OSCEOLA CONSOLIDATED MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Plymouth, Arizona, California.

Notice is hereby given that, at a meeting of the Board of Directors, held on the 28th day of August, 1901, an assessment (No. 12) of one (1) cent per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin to the secretary, at the office of the company, 307 Montgomery street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 6th day of October, 1901, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 28th day of October, 1901, to pay the delinquent assessment, together with the costs of advertising and expenses of sale. By order of the Board of Directors.

Office—307 Montgomery street, San Francisco, California.

ETNA PETROLEUM COMPANY.—Principal place of business, San Francisco, California. Location of works, Fresno County, California.

Notice is hereby given that, at a meeting of the Directors, held on the 22nd day of August, 1901, an assessment of ten (10) dollars per share was levied upon the capital stock of the corporation, payable immediately to the secretary, at the office of the company, No. 316 California street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 24th day of September, 1901, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on the 14th day of October, 1901, to pay the delinquent assessment, together with costs of advertising and expenses of sale.

Office—No. 316 California street, San Francisco, California.

WILLIETTA MINING & MILLING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Tuolumne County, California.

Notice is hereby given that, at a meeting of the Board of Directors, held on the 13th day of August, 1901, an assessment (No. 2) of one (1) cent per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, Room 8, 206 Sansome street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 30th day of September, 1901, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 21st day of October, 1901, to pay the delinquent assessment, together with the costs of advertising and expenses of sale. By order of the Board of Directors.

Office—Room 8, 206 Sansome street, San Francisco, California.

DIVIDEND NOTICE.—JAMISON MINING COMPANY.—By order of the Board of Directors, at their meeting on September 6th, 1901, a dividend of \$1.00, being three (3) cents per share on the capital stock of the company, will be paid at the office of the company, Room 56 120 Sutter St., San Francisco, Cal., on Monday, September 23rd, 1901. Transfer books will close at noon on Saturday, September 21st, and will be reopened at nine o'clock on the morning of Tuesday, September 24th. On the written request of any stockholder addressed to the secretary, check for the amount of dividend on stock standing in his name will be mailed to any address given.

Office—120 Sutter St., San Francisco, Cal.

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Notice is hereby given to all parties not to use, manufacture, permit to be used or manufactured any device employing the process of the ROBINSON ORE CONCENTRATOR or any infringement thereon, except by legal authority.

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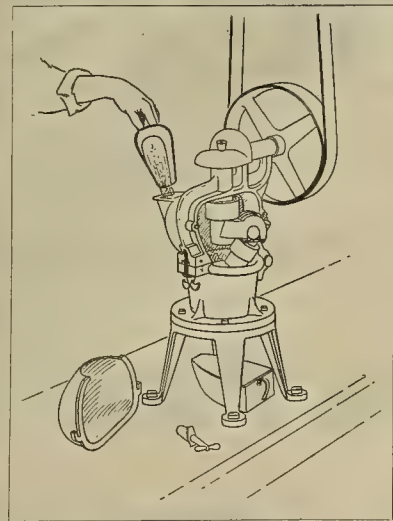
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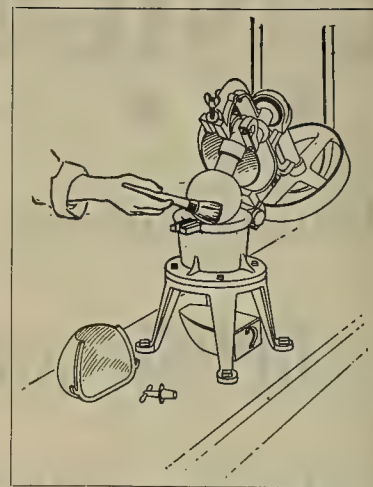
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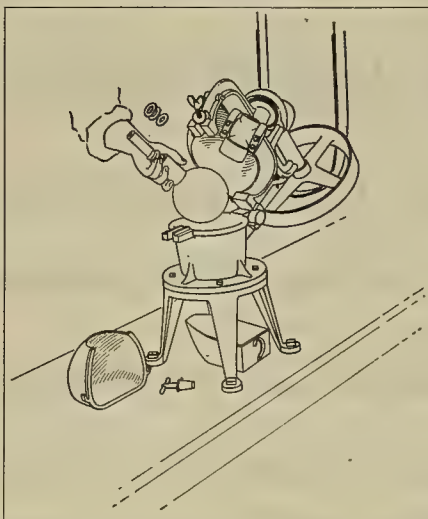
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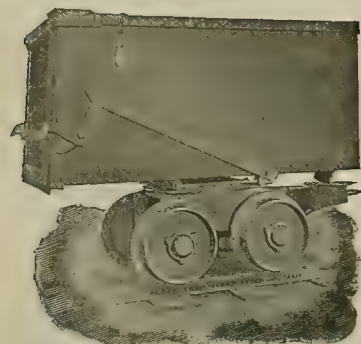
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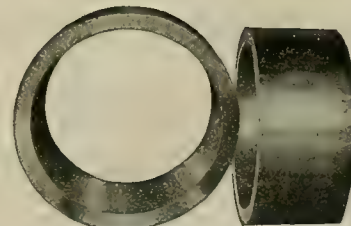
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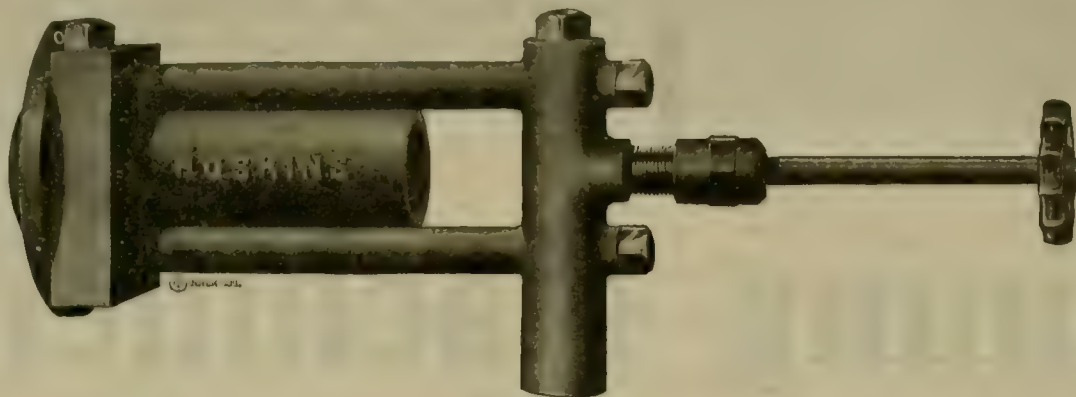
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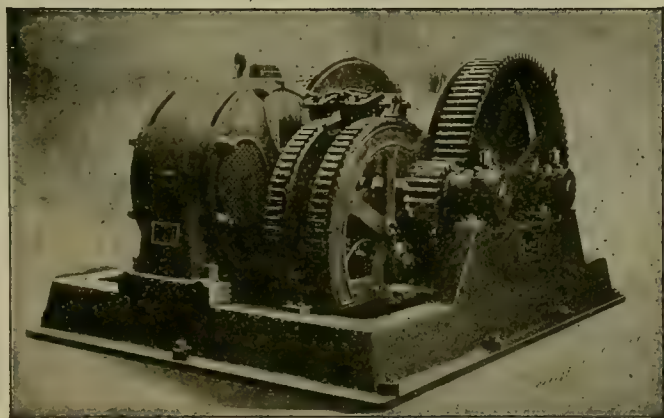
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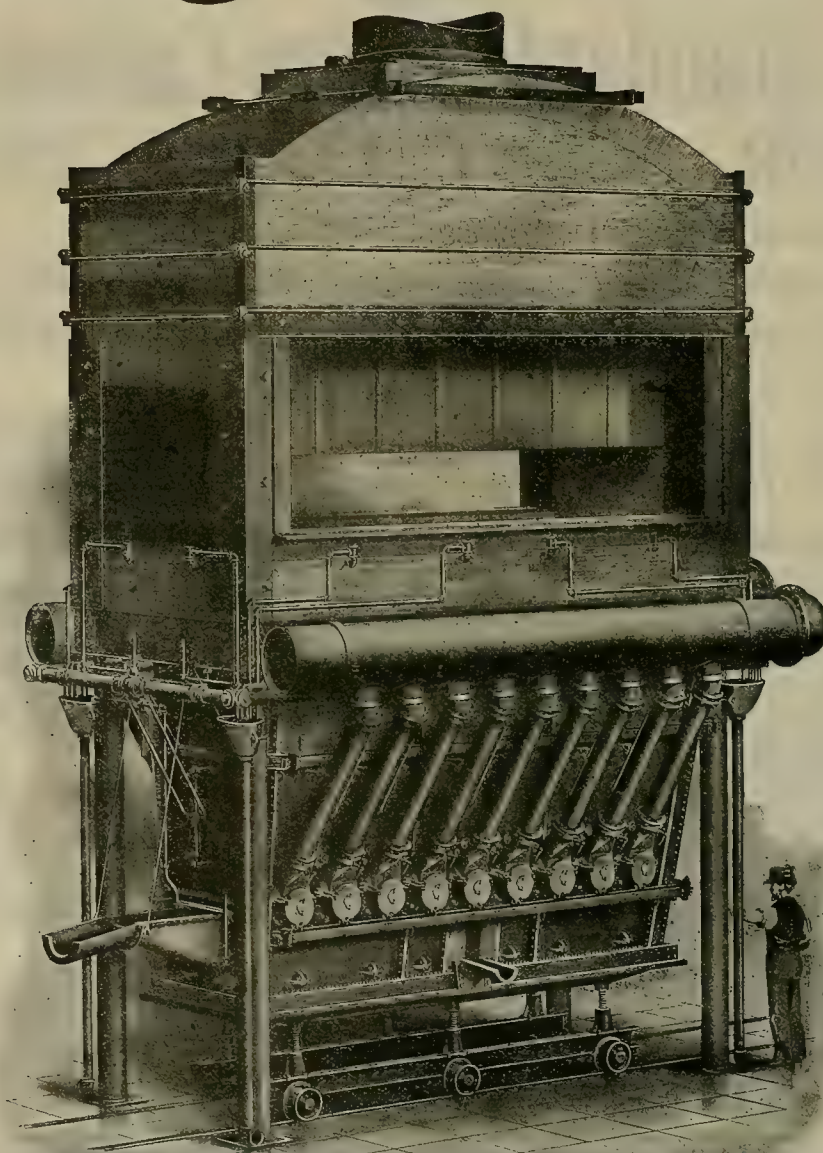
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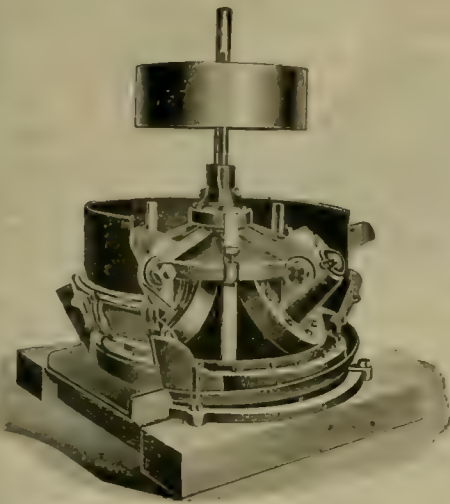
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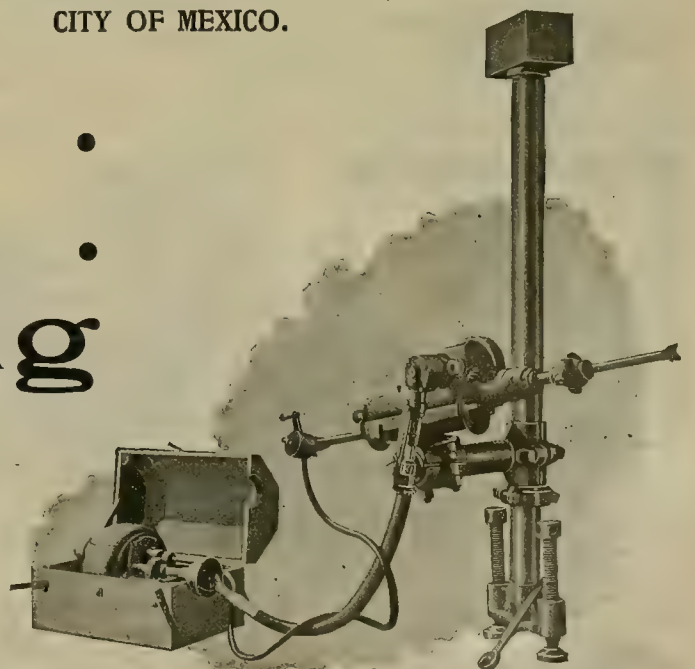
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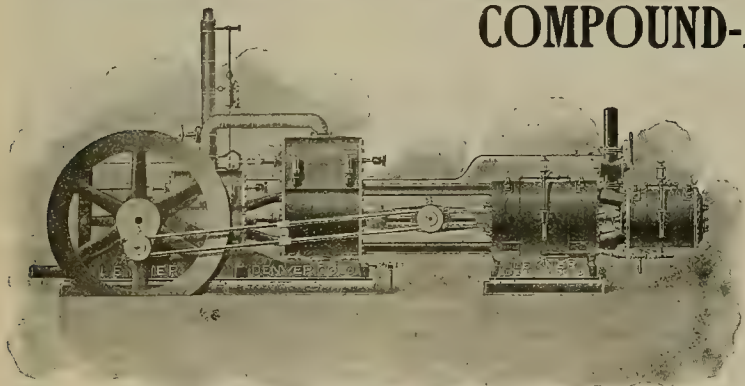


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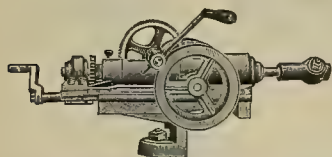
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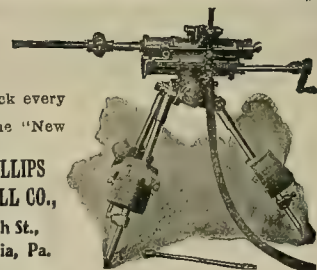
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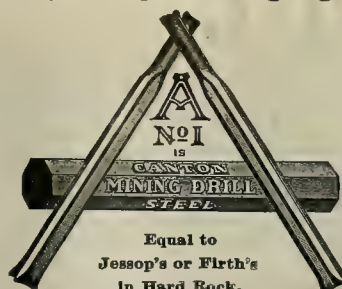
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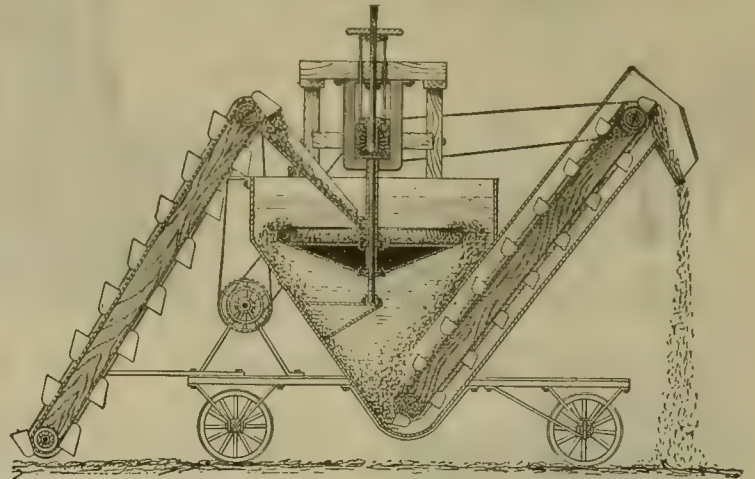
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The above cut gives a sectional view of the "Wonder" Placer Machine as it appears in operation.

The machine is mounted in a Portable Steel Tank, which is equipped with conveyors for feeding the ground into the machine and for removing the tailings. The tailings conveyor is equipped with our patent, endless, perforated steel buckets, which are designed to keep the tank perfectly clear of tailings all the time.

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Every practical mine operator and expert who has seen our "Wonder" machine in operation concedes that it is the greatest machine in existence.

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BOISE, IDAHO, July 24th, 1901.

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Yours very truly,

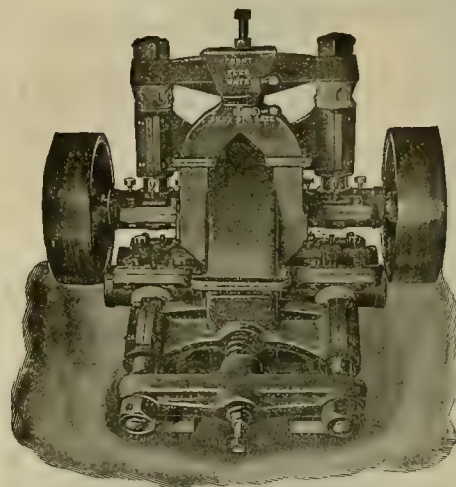
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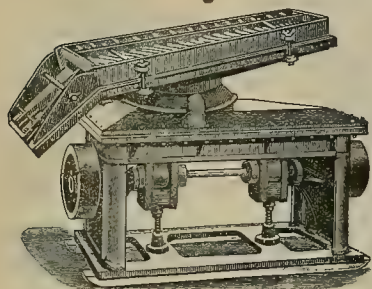
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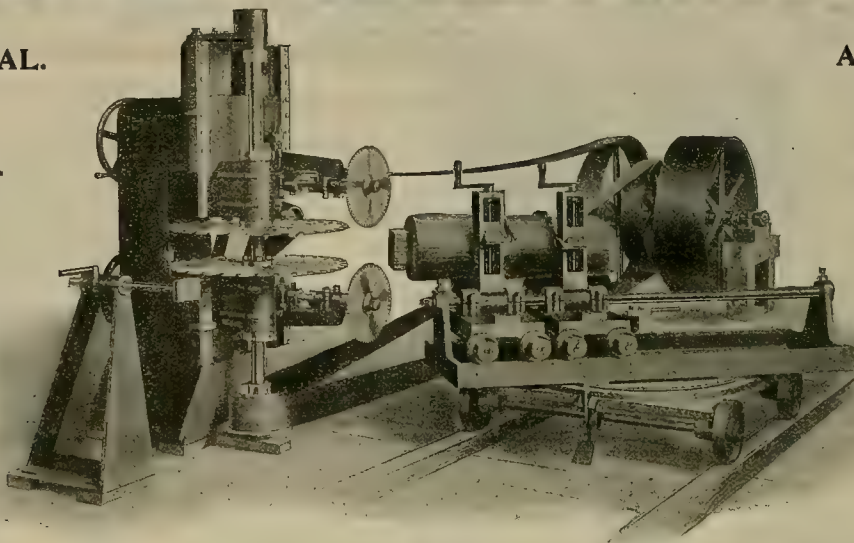
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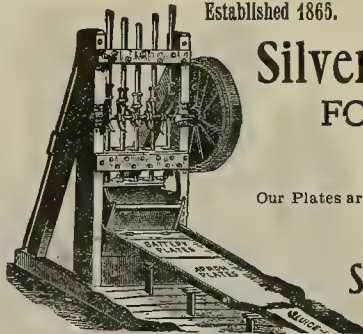
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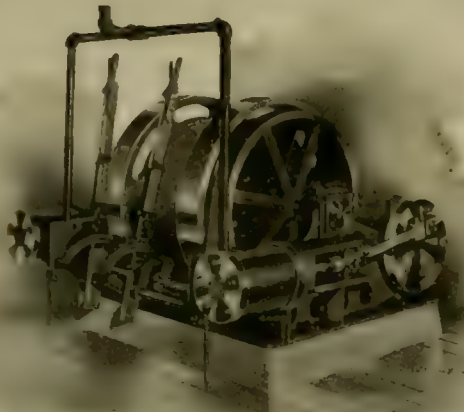
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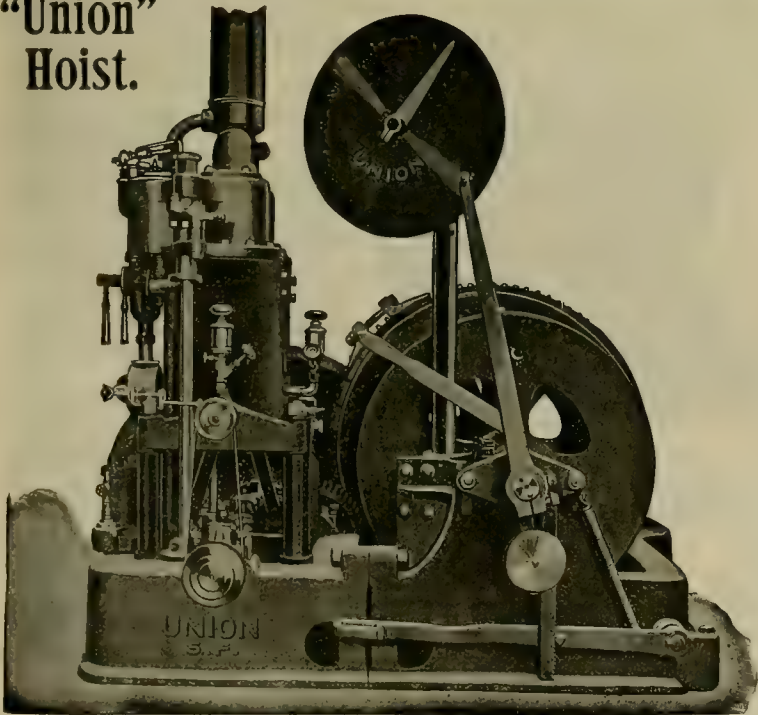
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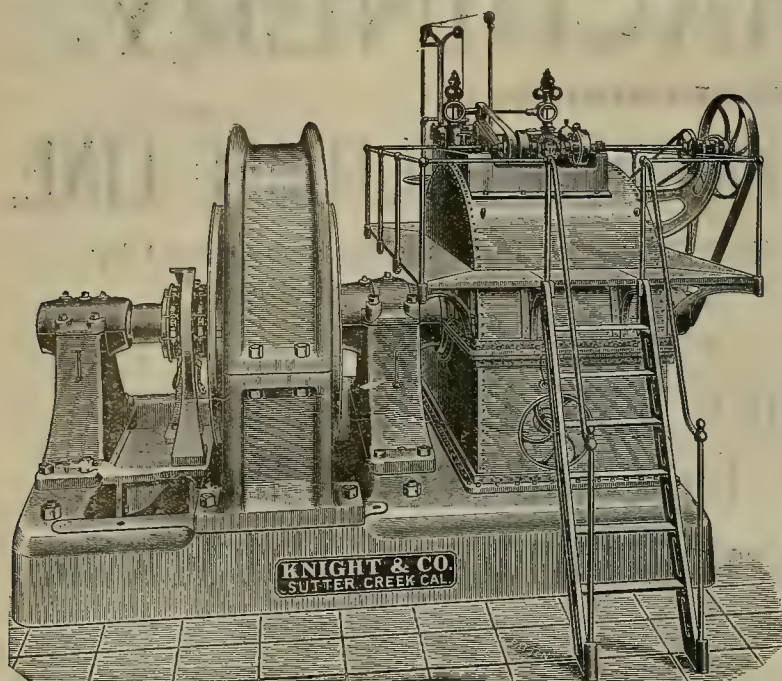
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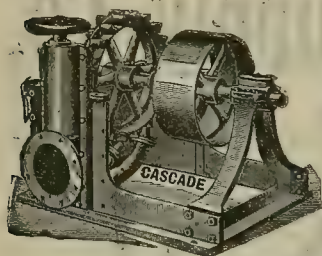
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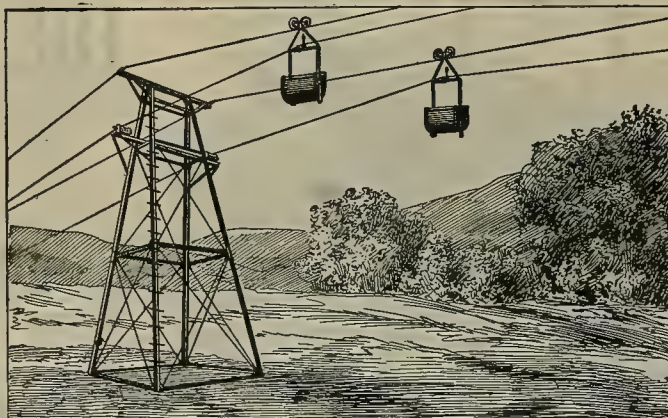
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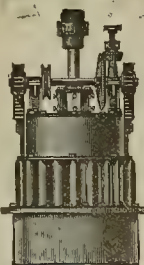
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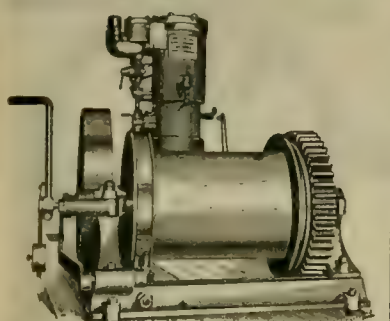
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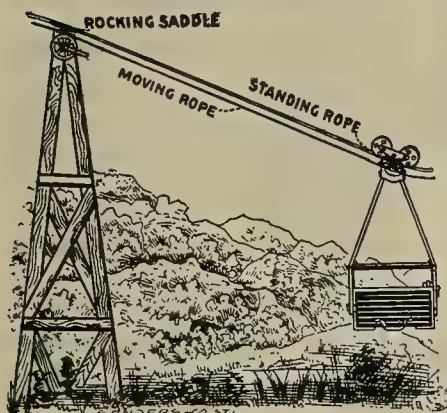
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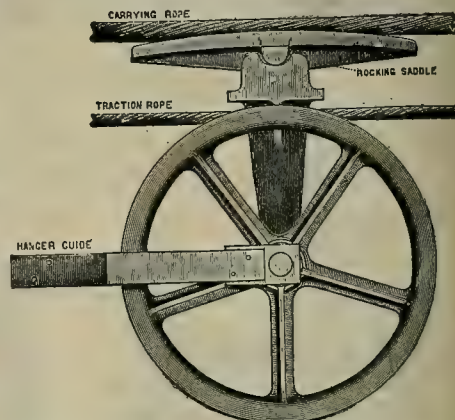
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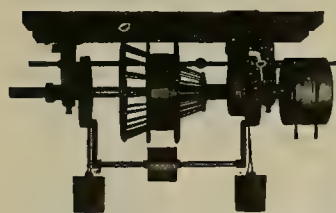
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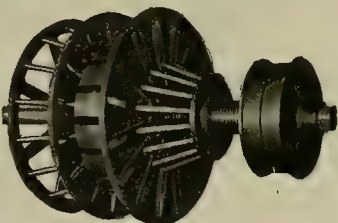


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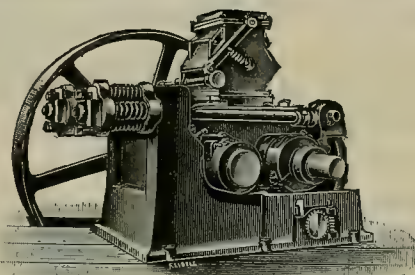
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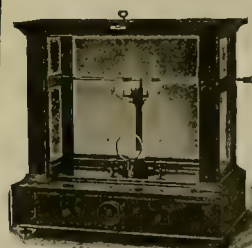
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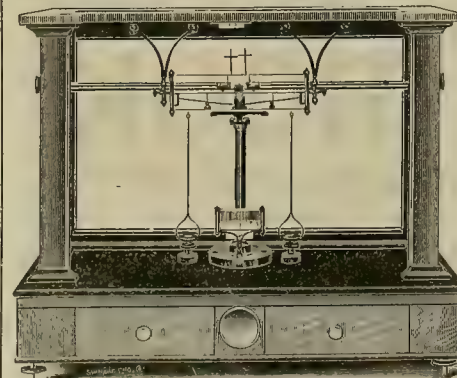


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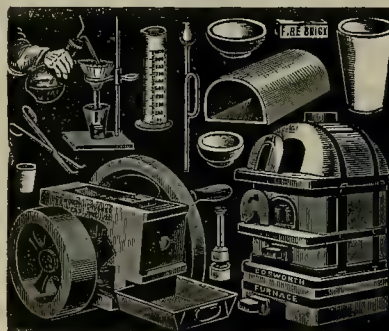
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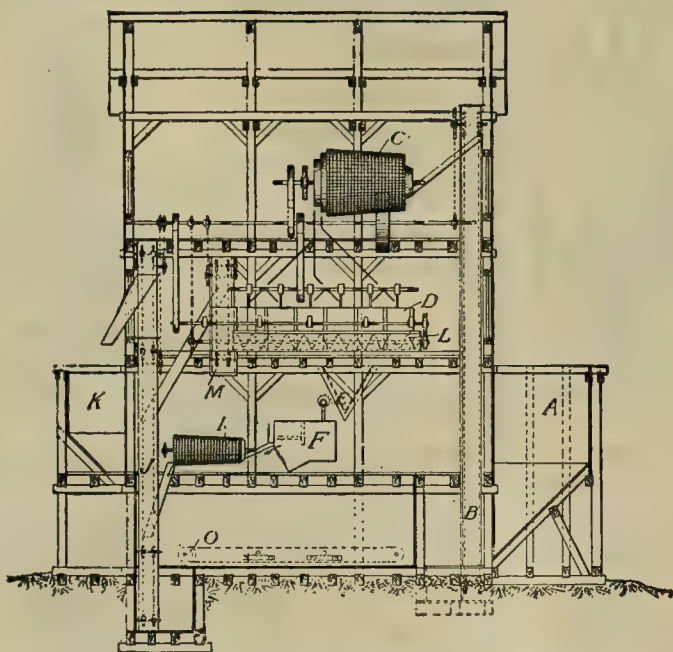
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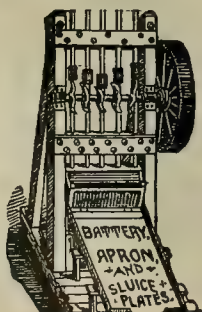
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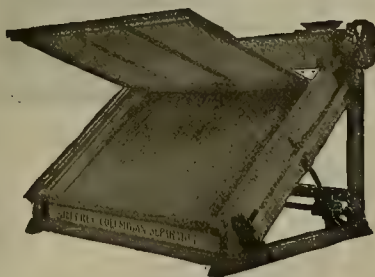
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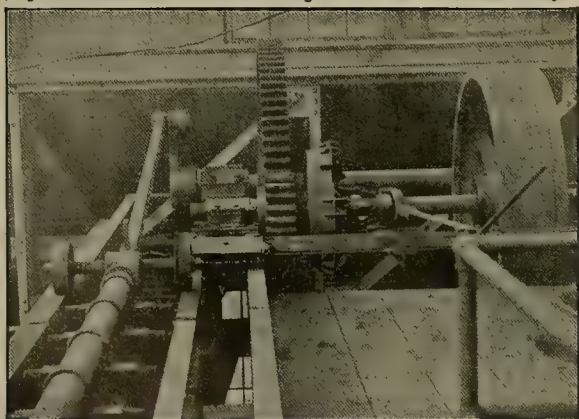
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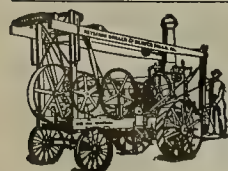
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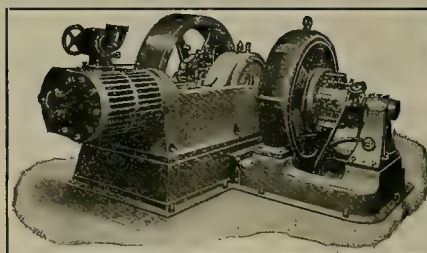
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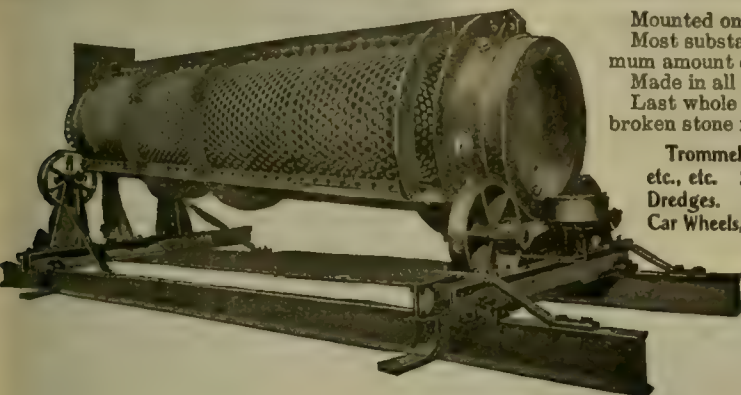


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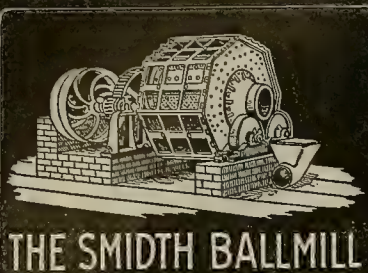
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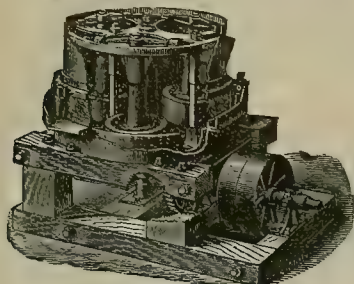
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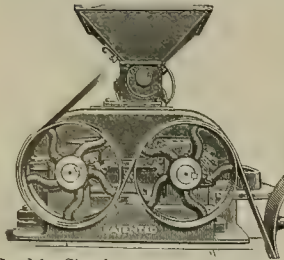
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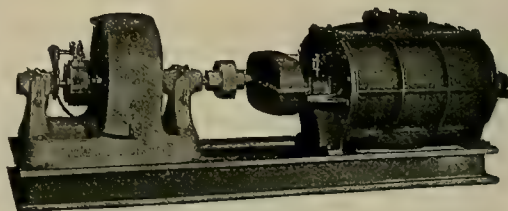
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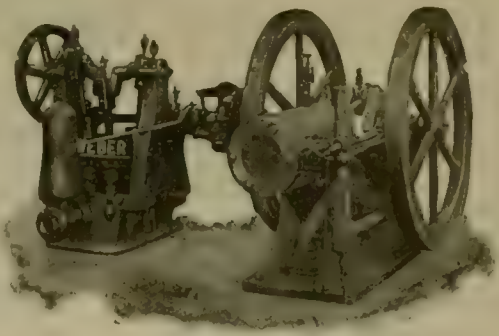
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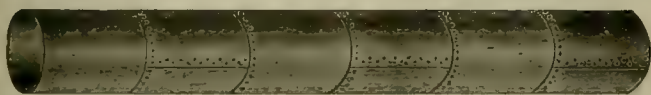
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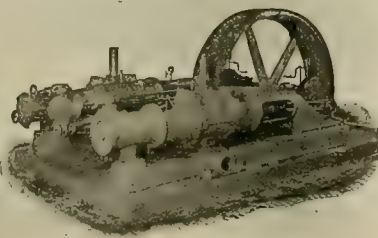
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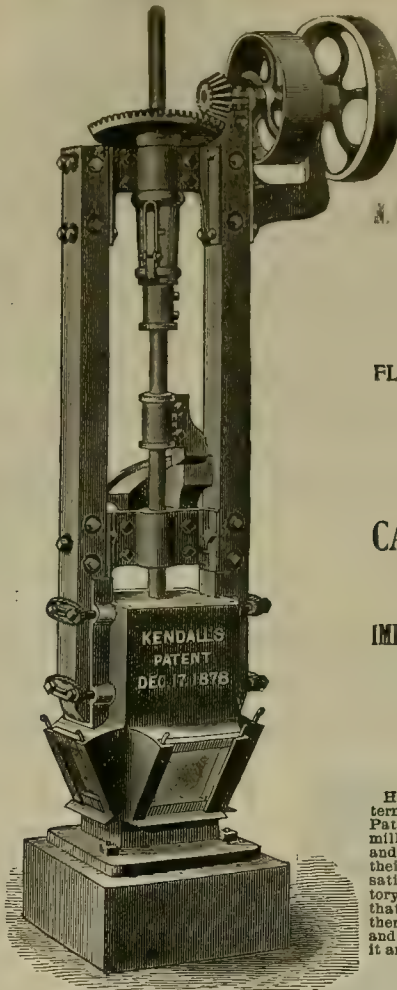
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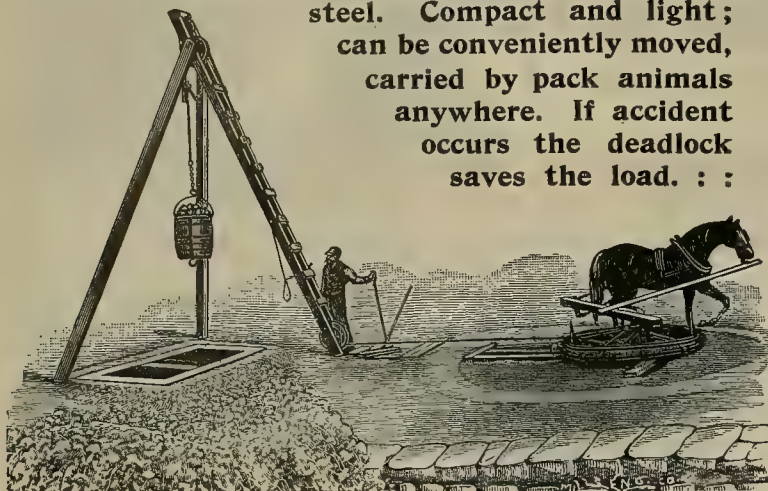
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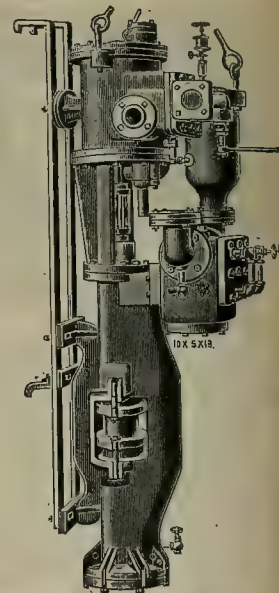
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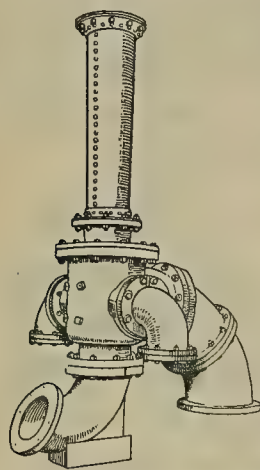
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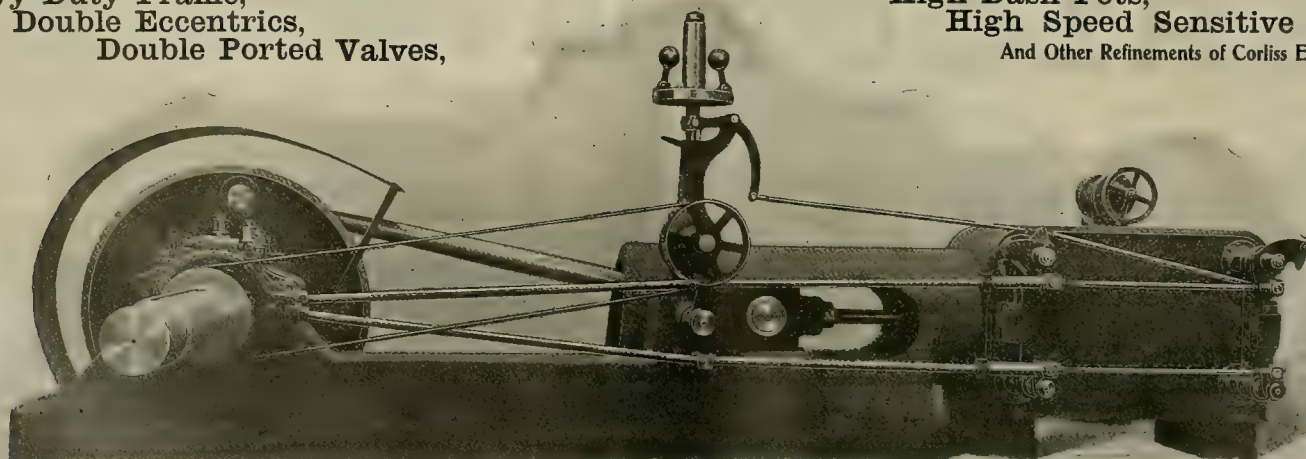
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SAN FRANCISCO, SATURDAY, SEPTEMBER 21, 1901.

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Reno Mining District, Nev.

To those who knew Nevada in the old times, between 1860 and 1890, the Nevada of 1901 has all the difference and novelty of a newly discovered country. The idea that Reno, the railroad junction where you changed cars the morning after you had left San Francisco en route to Virginia City, is the center of a mining district of a present importance equal to the Comstock, and of a prospective importance greater than the Comstock, is not readily grasped.

The old Nevada in the minds of men centered around Virginia City, illustrated on this page. When the gold and silver output of its mines dwindled away toward the vanishing point, the belief of people, even of those who remained in the State, disappeared with it. Years have had to elapse to bring back some of the old faith, and with it some new work, to show to new people, as well as the old, that Nevada still has fortunes in her mines of metal for those who seek for them.

Reno is not the only district in Nevada where new mines are being found. By those who have thought they knew the reserve mineral possibilities of the State it would, however, have been selected as among the least likely localities to become a mining district. As late as 1895, in publications descriptive of the resources of the several counties of Nevada, the mineral possibilities were considered of so little consequence as to be unmentionable.

The illustration of the city of Reno on this page is suggestive of farms and homes rather than of mines. Aside from its position as a railroad junction, the place has been the center of by far the larger part of the agricultural industry of Nevada. The discovery and development of the mines takes nothing away from this established industry. It does not change what exists, but adds what did not exist.



Virginia City, Nevada.

Reno naturally is expanding and gaining under the new impetus. Washoe county, which this year for the first time has a mineral production exceeding its agricultural, is finding its wealth-producing resources more than doubled.

Like many other mining districts, Reno owes its present distinction to the persistence in prospecting of a man who believed in his own knowledge, and who refused to accept as a fact the opinion of the great majority of the Reno people that there could be no mines where he was looking, because no one had found any. George Wedekind found at last what he was looking for, and his success not only started the great majority in search for other mines, but it has given confidence to the owners of many older pros-

pects under the stimulus of which many of them are being developed into mines.

Looking at the results after their accomplishment, it seems strange that they were not anticipated. Virginia City and the Comstock are barely 20 miles away. Steamboat Springs, remnants of the mineral-bearing thermal waters that accompanied the building of the Comstock lode, are only 6 miles away. The same plutonic rocks exist at Reno as at Virginia City, and mineral-filled pipes of dead fumaroles are to be found near Reno that show a former extension of the Steamboat Springs region. To carry the comparison further, the ores found are of a grade and mineral character similar to the old surface ores of the Comstock. Nothing so rich as the Comstock

has yet been found, but the kind of ore and rock conditions permit of the hope for large and rich ore bodies. There is evidently at Reno much less denudation than at Virginia City. The old surface, in fact, appears to be covered with float from higher rock masses. Bonanzas can hardly be looked for at the surface.

Reno, if a long time in realizing that within her own limits there was metal wealth, is now backing the knowledge of it with her own capital, and will realize its profits. Twenty or more associations of Reno business men are developing promising prospects. The original discovery of Wedekind is being exploited under local ownership. Its production has already added nearly \$150,000 to the permanent wealth of the district.

The development of the mines of Reno district would now seem assured under conditions giving the profits to the enterprising people of that community. The city itself is as typical of new Nevada mining as Virginia City is of old Nevada mining.



City of Reno, Washoe Co., Nevada.

MINING AND SCIENTIFIC PRESS.

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THE making of a great copper mine is an affair of many months, if, indeed, it is not many years. The technical and business importance given to the very large copper mining and metallurgical operations has tended to discount commercial operations on a small scale. There is no real occasion for this. Small copper mines can be put into the producing stage in a reasonable time. The operation of a small mine can be made profitable. The economies of production can be applied and taken advantage of by the small mining operation to very nearly the same ratio of efficiency as the large one. The small operation is not necessarily dependent on the smelting and refining plants of the big operations to have its ores reduced to metal. There are lixiviation and even smelting methods which can be economically employed in small units and which are not costly of installation. Experiment and invention are making rapid advances toward providing cheap and efficient processes for small mines and small capital. The investor must not overlook the necessity for the continued application by him of the same exact business and technical methods which have made large copper mining operations so profitable. Big works can grow out of little works, but exactness of technical methods and fidelity to sound commercial principles must be the basis of operation of the little works.

In this issue there is a paper written by Jesse Scobey of Denver, Colo., on "Sampling Mill Work," that fills up one of the vacant places in the hitherto published writings descriptive of exact mining and metallurgical methods. It is a fact that the efficiency of processes of metal recovery from the mine run of ore expressed in percentages are more often guesses than otherwise, and not very good guesses either. The sources of error, as Mr. Scobey correctly indicates them, are inaccuracies at the beginning of ascertainment of the facts. The ore weights are not accurately determined, nor is the sampling of the mine run of ore certainly effected. The system, which is explained by Mr. Scobey for obtaining the factors from which efficiency of work is determined, is simple, and is independent of the sources of error noted above. While devised particularly for sampling the work of a concentration mill receiving mine run of ore and delivering concentrates by rail, it can be modified to permit of application to work where the mine cars deliver ore directly to the mill ore bins. The principle which it applies, exactness in measuring quantities, commends itself to the attention of mine operators and managers. Applied by Mr. Scobey's method, it makes possible the close system of records and cost keeping of separate openings in the mine, and of separate machines in the mills that this paper editorially advocated in last week's number.

The Assassination of President McKinley.

Thrice within four decades this country has lost its Chief Executive by the all too skillful stroke of the assassin. Thrice has a loving people been plunged in the depths of grief and mourning at the behest of envenomed hate, of lunacy and of anarchy. Thrice has the deed been profoundly deplored and the doer received universal execration and repudiation. In no case has the murderous wretch been cheered by the faintest expression of satisfaction. Two have gone to their graves unwept and unhonored and the third will quickly follow; though it must be owned, with the bitterest chagrin, that our latest abomination may be less desolate of approval than his predecessors. Anarchy has risen to the light of day in this free country as it dared not in other lands, and perhaps the most difficult question which has arisen in the history of the American people now demands solution. Manifestly, freedom is not for all, but for those who merit it. How shall the priceless boon of liberty be preserved for these by its withholding from the others? American statesmanship and humanity have never faced a more difficult question.

It is not surprising that in the more recent experience of the American people foreign commentators read the failure of our proudest ideals. It is not surprising that the London Globe of last Saturday says: "Out of ten Presidents since 1861, three have been assassinated. The percentage is appalling and cannot be paralleled in any civilized State since the days of the Roman empire. If the Presidential chair is not to be regarded as an ante-room of a funeral vault, some very stringent precautions will have to be resorted to. The days of republican simplicity, when the President mingled with his fellow citizens, have passed forever." If this, indeed, be true, if we must forsake the traditions of the republic that the President is always one of the people—an elder brother, with the same right to liberty in his personal movements, safe from the murderer as we are, and free to participate with us in occasions of public interest and rejoicing—then, indeed, sad disappointment will come upon us all. Such a conclusion will not be reached quickly nor easily while there are brave men to meet danger in support of what they conceive to be a manifestation of faith in an American principle.

One of the first deeds of President Roosevelt after he, with deep feeling, took the oath of office on Saturday last, is thus described by telegraph:

The President, after the meeting of the Cabinet, saw a few personal friends, and then, putting on his hat, said to Secretary Root:

"Let us take a little walk up the street and back again; it will do us both good."

Secretary Root assented. When they came to the front walk the police and detectives in citizens' clothes started to follow him. He turned and told them that he did not desire any protection. "I do not want to establish the precedent of going about guarded," he said.

Every American will honor the new President for his declaration that the traditions of the republic must be preserved. He evidently does not desire to sacrifice his right of personal freedom, nor to sacrifice by official cowardice the personal bravery which every citizen should possess.

This may seem a little thing, but it is in fact a very great one. All our Presidents have gone about where honest men have a right to go, and they all should and shall do so in the future. This matter really involves the whole national attitude between our people and those whom they choose to rule over them. A secluded ruler, a ruler afraid of the people, are things abhorrent to the American idea, and if such conceptions of our rulership and our citizenship should be allowed to prevail, we should bid farewell to many things which now constitute the essential principles of our governmental system. A ruler out of sight, a ruler hedged about by protective artillery; it is such which human progress is passing beyond. There must never come a time when a President of the United States cannot say: "Come, let us take a walk up the street and back again; it will do us good."

Well, if not this, what then? Evidently the citizenship of this country must be purged. We have grown careless during the later years of wonderful prosperity and development. We have gloried in

the fact that American patriotism would drive every foreign fervor from the blood of those who come with in its influence. So, indeed, it will with all save one, and that is not fervor but fever, and must be resolutely and searchingly driven out of the hearts of men, or they must pay the penalty of treason. Not only must the gates be closed to all immigration not clearly desirable, but public sentiment must drive out of the country all of the anarchy breeding kind we now have among us. In this country, as events have shown, there is no danger of infringement of liberty, but there is danger of carelessly promoting license. Every intelligent citizen knows the difference between free discussion and vigorous denunciation of public wrong doing and the beliefs and methods of anarchy. Fortunately, the distinction is so clear that a wayfaring man, though a fool, need not err therein, and if he choose anarchy let him know that he will be crushed beneath the heel of the American people. That such is the will of the people there can be no doubt nor misgiving. If there be any excuse or palliation for anarchy anywhere, there is none under the American flag.

SAN FRANCISCO has been a storm center of strikes this season, greatly to the injury of the cause of honest labor and to the detriment of the manufacturing interests. With mistaken notions of liberty—the bitter fruit of blossoms blown to us from across the seas—some of the strikers seem to think that they can quit their jobs and yet command them; can refuse to work and yet dictate who shall or shall not take up the work they have rejected. No man can throw away and keep a thing at the same time, and though he may terrorize or destroy he cannot permanently win in an attempt to prevent others from doing the necessary work that he refuses to do. The men that beat others who want a peaceful chance to earn money; the men who poison horses and destroy their former employer's property have no conception of liberty or the rights of man, and are doing labor and labor unions more injury than the worst enemy of labor unions could devise. Liberty is not lawless license: liberty is "the right to do as I please provided I do not interfere with my neighbor's right to do as he pleases," and "if I relinquish a job I have a right so to do, and my neighbor has just the same right to take the job that I threw away." Rightly run, labor unions are a help and in numberless instances have shown abundant good reasons for their existence. A properly conducted labor union is of benefit to employe and employer alike. The trouble is that in their zeal to unionize those who decline to be unionized many members of labor unions forget that while they have equal rights, they have none superior to others, and the better members remain silent when such despotic un-American methods as those now practiced in San Francisco are carried on. While intelligence controls a labor union it is a good thing; when run by a mob it becomes a menace to mutual prosperity and to free institutions.

THE General Land Office ruling that gilsonite in Colorado must be located as a lode, and not as a placer, may be used to support some novel contentions in the California petroleum districts. The line between gilsonite and asphaltum is not sufficient to make a legal difference between them when it comes to a rule for making locations. Bituminous rock is simply a low-grade asphaltum deposit. It has, however, a commercial value nominally exceeding mining costs and is a mineral a deposit of which is locatable. Petroleum, asphaltum and bituminous rock occur together in the same lands in California. Heretofore the locations have been made as placers for petroleum. As asphaltum and bituminous rock are legally lode deposits, the placer locations cannot hold them. They are subject to location over the placer locations by the operation of the same law which provides for the location of gold-bearing quartz lodes on placer claims. While it is not probable that many placer petroleum claims are subject to lode location over them, some of them certainly are. It would seem desirable that, instead of chancing a possible reversal of the ruling by the courts, the owners of such jeopardized claims should protect them by making lode locations of asphaltum and bituminous rock outcrops. Better to do that than incur the costs of contest with some one else who might locate them and initiate an extralateral right litigation for which there are no precedents.

Concentrates.

THE specific gravity of Portland cement carefully dried should be between 3.1 and 3.25.

THE tenth annual session of the California State Miners' Association will be held in San Francisco on October 21st, 22d and 23d, 1901.

WITH sandy gold ores, largely fine stuff, a mill of the roller type will put out through more material with the same power consumption than stamps.

UNDER ordinary working conditions the percentage of the total ore fed to a stamp mill that will be crushed finer than 100 mesh will vary between 28% and 40%.

ACETYLENE is reported to have been used in mine illumination at a considerable increase in the quantity of light, accompanied with a decrease in cost as compared with candles.

TOOLS should never be sent down or out of a mine shaft in a hoisting bucket without being securely fastened inside of it.

A STRAIGHT EDGE to a drill bit throws too much work on the ends. The edge is properly made rounding to distribute the work. The curvature is modified by the character of rock being cut.

CARIBOO, B. C., GOLD runs from \$17.10 to \$18.47 to the ounce. Dawson gold runs from \$15.50 to \$16.50 to the ounce, and beach sand gold from the north end of Vancouver island \$17.87 to the ounce.

THE best specimens of strontium minerals in the United States have come from a cave found in western Ohio near Lake Erie. The entire deposit of large crystals was removed and sold for cabinet display.

ONE POUND of petroleum, .920 gravity, free from water, sand and clay, will evaporate as much water in a steam boiler as two pounds of anthracite, two and one-quarter pounds of ordinary bitumen coal or three and one-half pounds of lignite.

GAS has been made in Los Angeles, Cal., from petroleum distillate that cost 14 cents per 1000 cubic feet. Tested in a gas-burning furnace, a piece of cast steel $\frac{1}{2}'' \times 4'' \times 18''$ is claimed to have been brought to the fluid point in ten minutes.

THE U. S. Circuit Court, by Judge Beatty, has ruled that a mine foreman is a fellow servant under the law and that injuries received as a result of his neglect or carelessness are not a ground of action on which recovery can be had against the owners of the mine.

THE abundance and cheapness of capital is contributing a great deal to effecting the substitution of electric power for steam for operating mining plants. The interest in the machinery is found to be less charge than the current cost of fuel and the labor required to handle it.

THE custom in Alaska of designating claims by numbers, above and below discovery, is a system of identification which has been adopted from the Canadian custom followed in the Klondike. It is particularly convenient in assisting the tracing of titles through the records.

AT the North Star mine, Grass Valley, Cal., a red-wood stave pipe wrapped with galvanized asphaltum-dipped wire is used as a conduit for telephone wires in the 1600-foot deep shaft. This wood pipe was used as a substitute for metal pipe, which could not be had on account of the strike.

THERE is a very large and increasing consumption of mica in the United States. Mica in clear sheets, 4x4 inches in size and upward, is worth from \$1 to \$3 a pound in New York City. Eugene Munsell & Co., 218 Water street, New York, are dealers in this mineral, and samples can be sent to them.

THE coal miners of the Tennessee Company in Tennessee are paid a price for digging coal dependent on the price at which the company sells its pig iron production the preceding month. If the price of pig iron increases the price paid for digging coal increases with it. If pig iron sale price decreases less is paid for digging coal.

WITH a very low discharge through the screen of a stamp battery there is always a chance for excessive scouring of the amalgam from the plate on the chock block. Amalgam is driven out through the screen and some loss is apt to result. For this reason some mill men use no inside plates at all where they employ a low screen discharge.

SILICA CEMENT or sand cement is manufactured by grinding together equal quantities of Portland cement and clean sand. The cement is made extremely fine by the grinding with the sand and the latter is also made very fine. The effect on mortar or concrete of this extreme fineness is to make it more dense, the fine material being increased in volume.

THE use of guides to keep a belt on a pulley is a poor makeshift. The edges of the belt invariably wear against the guides. The belt will run to the largest diameter of the pulley. This is the crown in the center and if the belt is so laced as to be under uniform tension and the shafting of two pulleys parallel, the belt should run true to the centers of both pulleys.

THE average cost of the copper produced in the United States during the last year is very close to 8 cents a pound, as against an average selling price of 16½ cents. The average of the cost at 8 cents has no significance except as a measure for the aggregate of the

profits. The range of the actual costs of production has been from 3 cents to 17. It is a question as to what is the cost per pound of copper where its production is from an ore that pays a profit from gold yield alone, making the copper, considered as a by-product, costless, except for melting, transportation and selling charges.

THE Supreme Court of Iowa has sustained the validity of an oral grant of mining privileges under which an entry was made and much labor and money expended, holding that the grantees acquired an interest in the land which was transferable, and did not acquire simply a license which was revocable or terminated at the death of the grantor.

IN building what is known as the Benton cut on the Great Northern R. R. in Montana, a steam shovel excavator with 1½-cubic-yard dipper was employed. With trains of nine or ten cars each of 1½-cubic-yard capacity the time required to load a train and put the first car of the succeeding trains in place was two minutes. In each ten-hour shift 800 to 900 cars were dumped.

THE United States mining law relating to the year for assessment work has not been changed. It still begins January 1st. The idea that it had been changed has probably had its origin in the report of the Senate Committee on Mines to the Senate, which recommended the change to October 1st. The Senate has taken no action on the report, and after it has the other branch of Congress must act on it.

THE Commissioner of the U. S. Land Office has ruled that hydrocarbon claims—for example, asphaltum, bitumen and gilsonite—must be located as lode claims, not as placers. The ruling was made in a contest between a senior placer location of a gilsonite deposit in Rio Blanco Co., Colo., and a junior lode location of the same ground. The ground of the ruling was that gilsonite was found in fissures and was logically a lode deposit.

THE fineness of the Mexican silver dollar is 900 by the coinage law. On remelting it is found to run from 899 to 900. The Mexican silver dollar is slightly heavier than the United States dollar, \$1000 Mexican weighing 15.63 ounces more than 1000 United States silver dollars. The face value is the same, but the Mexican dollar does not go by its face in the United States, but by its bullion value, which is fixed largely by the demand and supply market in Chinese exchanges.

THERE is considerable difference in the hardness of the ore in the Lake Superior region copper mines. At the Atlantic mine it is not much harder than indurated clay. At the Isle Royal mine it is an extremely hard flinty epidote. This difference makes a great difference in the cost of mining and milling and explains the profit that is made at the former mine from a production of thirteen pounds of copper a ton, where fifteen pounds to the ton in Isle Royal ore cannot pay costs.

IT has been found that stearic acid applied to and absorbed by the inner surfaces of a porous mould—plaster of Paris or baked moulding sand—will increase the fluidity of soft metal poured into the mould so that sound, homogenous castings can be made where the metal form cast is of very thin metal. With the ordinary mould, untreated with the stearic acid, the pouring of the soft metal, to make thin castings, has been impracticable, the poured metal not holding its fluidity sufficiently long to fill the mould. The new process has been patented.

HIGHLY refined formulas for the flow of water in pipes are not practically of much utility. The formulas are prepared from experiments on pipes that for convenience may be termed standard as regards clean, smooth interior surfaces, joints and bends. In practice no pipe line is standard in being an exact multiple of the pipe from which tests of flow have made formulas. Nor is there any knowledge that will tell the exact ratio of efficiency to the standard pipe. Approximate formulas with an allowance on the safety side can be used and will give safe estimates for construction.

WHERE there is even a comparatively small stream of water flowing naturally out of a tunnel or being pumped out of a shaft, the opportunities for its utilization to develop power should not be overlooked. It is frequently the case that the water pumped out of a mine shaft can be used to develop the power required to do the pumping. It can be safely estimated that for each eleven gallons of water flow per minute, with each 100 feet of fall available out of the mine, .25 H. P. can be obtained. Expressed in another form, each 100 feet of head or fall or the water outside of the mine, can be estimated on for the power necessary to lift an equal amount of water between 50 and 60 feet in the mine shaft.

WHERE within the boundaries of a placer claim there is a known lode, it is advisable to locate it and patent it with the placer claim, even should it not be known to be profitably metal bearing. The cost of obtaining the patent to it without contest is a less sum than the expense of a lawsuit over the title to it. It may later be discovered to have a value as a lode mine through the finding of a rich ore body, or a decrease in working costs or rise in sale price of the metal. The patenting of the lode is insurance against possible litigation. In patenting the lode, 25 feet width on each side gives sufficient area to protect it. Lode areas have to be paid for at the rate of \$5 an acre, while placer areas only cost \$2.50 an acre when bought for patent.

THE choice of drift mining or dredging a flat-lying gold-bearing deposit depends on a careful estimating of costs and conditions. It is assumed that the gold is all in the

bedrock, or in the bedrock stratum of gravel, and that the boundaries of the lead are known from preliminary driller prospecting, and that the same drill prospecting has made possible a proximate estimate of the gold values. The comparison is then between costs in which the magnitude of the deposit is an element. With a small deposit, drifting would probably figure out the least costly, as the capital investment is very much less. With deep ground and hard bedrock, drifting would probably be the safest. With shallow ground, soft bedrock and a large area of ground, the dredger will be almost certain to figure out the least costly. The mechanical appliances, as a rule, are more to be depended on for uniformity of cost throughout a placer mining exploitation.

THE slag piles of old lead smelters have been sources of profit for reworking. The ground the old smelters were built on has been profitably mined and in some exceptional instances mined a second time with profit. The brick and rock materials of old smelting furnaces have been known to pay well for treatment. So far there has been little attempt to treat the slags from old copper smelting furnaces where they were thrown away without being used over, and the possibilities of treatment of copper ore concentration tails have not attracted much attention. It would seem as if there is an opportunity for the chemist and metallurgist here. The older concentration plants did what would now be considered poor work, and some ores now treated do not concentrate close. One to two per cent of copper in tailings means twenty to forty pounds of copper to the ton in material that is already mined. There would seem to be possible a margin of profit to repay treatment by some of the leaching processes.

A CO-OWNER in a mining location can be divested of his interest in the claim or claims by the other co-owners if he refuse to contribute his proportion of the \$100 assessment work which the other co-owners do contribute. The statute of the United States defining the procedure to be followed should be adhered to strictly. It is doubtful if a demand for the proportion of an amount exceeding \$100 expended on a group of locations could be legally made. Under such conditions the demand of the defaulting co-owner for payment of his proportion of expenditure for assessment work on a group must be made for each one of the separate locations, and separate proceedings must be taken with each location. The defaulting co-owner in a group has the right of election of retaining his interest in some of the locations by paying up, and of relinquishing his ownership in other of the locations by defaulting. At the least, there would be the chance for a lawsuit if the proceedings were taken with the locations as a group.

WHERE two parallel lode claims made by the same claimant are located so that the common side line bisects as near as may be the center of the apex of the lode, it would seem that the senior of the two locations in point of time of location would take the lode wherever any of its apex was inside to it of the common line. If the entire width of apex in meandering went outside to it of the common boundary that portion would belong to the junior location. A court of equity in passing on such a case coming before it would seem likely to rule as above and might declare the junior location void. This last would seem inevitable if on the hearing it appeared that the lode on the common boundary line was the "discovery" on which both locations were based. The senior location, which in law would be the discovery location, could not be restricted to less than 25 feet of width on each side of the lode line if there is public land to that extent open to location. The court would possibly take the position that the senior location is legally entitled to 25 feet of the width of the junior as of the date of location of the senior claim where both are made by the same person with knowledge. This would show the junior location to be void. It would seem also that if the locator sold either of the claims a court of equity would hold that the buyer bought the whole of the lode, on the ground that it was the real thing that there was to sell.

THE work done by compressed air results in the using up of its heat units—that is to say, the air is colder at the end of an expansion than at the beginning. There is no difference in the quantity of work between expanding a given quantity of the air from 185 pounds gauge pressure down to 100 pounds gauge pressure and expanding the same quantity from 100 pounds pressure down to fifteen pounds, or the atmosphere. In either case exactly the same number of heat units that were in the air in the beginning must be used up. The higher the gauge pressure of the compressed air the larger the number of heat units it must lose in expanding to the atmospheric pressure. Practically these heat units are given to the compressed air by reheating before expanding. There is a mechanical limitation to reheating which makes the use of compressed air at very high pressure uneconomical. Liquid air represents the extreme of compression and the extreme conditions of uneconomical use. In experimental work no note has been taken of heat taken from the atmosphere during the expansion from liquid form down to working pressure, and claims of efficiency have been made which close analysis do not confirm. On large-scale commercial work the laboratory conditions cannot be maintained. The use of a compressed air plant exhausting back on itself, instead of the atmosphere, can not give any higher efficiency to the prime mover power, fuel or water, than exhaustion after work into the atmosphere.

Sampling Mill Work.

Written for the MINING AND SCIENTIFIC PRESS by JESSE SCOBEY.

When starting a new mill the aim is to make it a paying proposition at the earliest possible moment, and the resources of the head of the enterprise are wholly absorbed in keeping the mill going and in making what necessary mechanical improvements the circumstances of the case have developed and the treasury of the concern will allow. It is quite sufficient that the returns are in excess of expenditures, and it is only with the advent of competition that it is necessary to make a saving in the finest details of the method. Fortunately for the operator in gold milling, competition is restricted to individual merits. The character of the ore deposit is a factor, however, introduced into the milling of ores that compensates for the sharpening irritation of competition. Only a very few properties are in full values for a long life. The character and values change to make the deposit of lower grade or more refractory, and this is the mill man's perpetual spur to closer work. Older men, who are pioneers in milling, found it more expeditious to change their base of operations rather than their methods; finally the method claimed the man. The tendency of the mind is to perpetuate certain ideas. Political sentiments are mainly inherited, and modes of thinking require long periods of time to change. To the man who has expended the energy of a lifetime with the hammer and wrench as his sole aid in perfecting his enterprise it is hard to realize that a more technical method is superseding the old. The comparison of a close system of records heightens the observation and sharpens the interest in small details whose importance is only discovered by close and accurate work. Facts are developed that before escaped the observation and reasons for coincidences are sought for.

With the inauguration of business methods into mining, operators are not now content to simply accept the dividends of the mill manager, but it is required that he furnish data showing the cost of his work, the saving made, the time lost, and other details that go to make up the record of good or poor milling. The cause of poor milling may be inherent in the ore, and only from such detailed records can the scapegoat charge of "bad management" be sustained or disproved. Accurate records are often the salvation of many an earnest manager, and they should be as much insisted upon by him as by the directors.

By far the most prevalent system with small operators, where system at all is used, is to keep a record of the number of cars going to the mill per day, and to infer that each car will weigh, or that they will all average, a predetermined number of pounds, obtained by weighing some single car that was supposed to be an average, and to take a "grab" or hand sample from each ingoing car as it passes. From figures thus obtained the values going into the mill are supposedly obtained. From the smelter returns, giving the weight and value of the concentrates, the values recovered are eventually secured and the record of a month's run may be compiled, provided the concentrates happen to come out in even carload lots for the month. The comparison of the one to the other is published as the saving the mill is making. The same, however, is absolutely without meaning, for, while the values recovered are true, the weight of ore milled is to be seriously objected to; the weight of an occasional car may or may not be an average of the whole. We may logically deduce that the percentage saved arrived at may or may not be right. If we had omitted entirely to take any weights, a conservative figure might arbitrarily be selected to represent the weight of the whole, and might or might not be right. Figures and records mean absolutely nothing unless punctiliously and accurately kept. The so-called sample above obtained is to be bucked down by hand, and an absurdly small quantity is always selected, as personal endurance will not contemplate several tons and permit a sane man to undertake the work. Yet to sample ore, even as large as nut size, direct from the chutes will require a bulky mass of from five to ten tons to keep the probable error of the sample within the limit established by the assay. The system is, however, an aid to guessing, and should be so accepted. No results from such work should be in any way allowed to sway the judgment.

A step in advance is the establishment of track scales, whereby the actual weight of the ore is correctly determined; but as the strength of the chain is determined by its weakest link, so is the result of this work still weak, and, therefore, useless until positive and automatic sampling in quantities depending upon the size of the ore particles sampled is installed. With a proper device the ore may be sampled after it has been completely reduced and is in transit to the machine on which it is to be treated.

Mills are now common in which ore scales and samplers are keeping an accurate record of the incoming ore, and in such mills the weight of the concentrates may be determined daily by small platform scales, or

be obtained for the month by taking the railroad weight of carload lots. The weight must be known in order to arrive at the extraction made, as the formula used is:

$$\text{Extraction in \%} = \frac{\text{Weight of concentrates} \times \text{assay value}}{\text{Weight of ore} \times \text{assay value}} \quad (1)$$

As the weight of the ore and the assay value are known for each day's run, it should be considered economy to also weigh the daily output of concentrates and thus obtain a daily record of the work the mill is doing. If the ore is changing, it is well to watch the mill; if the ore is constant, it is good discipline to keep a record of the men.

These daily records can be more simply obtained by figuring from the assay value of the mill tailings, as, with this data, which is in itself most valuable, three different methods may be used, the last of which is to be especially recommended from its extreme simplicity.

In the first the weight of the ore, the weight of the concentrates, the assay of the tailings and the assay of the concentrates are alone needed, and the extraction is figured as follows:

$$\text{Extraction in \%} = 100 - \frac{(m - e) \times \text{assay tailings}}{(e \times \text{assay conc.}) + (m - e) \times \text{assay tailings}} \quad (2)$$

Where m = the weight of ore and e = the weight of concentrates. In this instance the assay of the crude ore is not needed and the formula may be useful where apparatus for sampling the crude ore is not at hand or is inconvenient to install, or where hand sampling has been in vogue and should be discontinued from its inaccuracy.

In the second the weight of ore, the weight of concentrates, the assay of ore and the assay of tailings are needed, and the formula is simply:

$$\text{Extraction in \%} = 100 - \frac{(m - e) \times \text{assay tailings}}{m \times \text{assay ore}} \quad (3)$$

In these equations the factor of weight is the most expensive to obtain and is especially troublesome where any storage capacity is at the head of the mill and after the ore scales. This, of course, is a permanent arrangement, as the ore must be delivered to the mill machines in a regular feed, and the ore bin and automatic feeder are essential to displace the intermittent supply furnished by the mine. In attempting to figure the day's run an approximation must be made of the ore remaining in the bins, and while the summation for the month is correct the separate items are inaccurate.

The third method is to be used in a completely modern plant now being built in Denver from plans of the writer. No arrangement is made for weighing either the incoming ore or outgoing concentrates, as in the case at hand a record of both will be kept in carload lots. The feature is that a daily or shift record of the percentage saved of extraction made is to be accurately recorded with only the assay of the ore, concentrates and tailings entering into the calculation. The equation is:

$$\text{Extraction in \%} = \frac{c \times (a - b)}{a \times (c - b)} \text{ in which } a = \text{the assay of the crude ore, } b = \text{assay of the tailings and } c = \text{assay of the concentrates.}$$

This is a very simple equation, and is very simply deduced, yet we have not known of any like or similar equation, and beg to submit a personal effort, hoping it may be found useful. It is arrived at in this manner, allowing:

$$\begin{aligned} m &= \text{tons of ore milled; } a = \text{assay of ore.} \\ e &= \text{tons of concentrates produced; } c = \text{assay of concentrates.} \\ (m - e) &= \text{tons of tailings; } b = \text{assay of tailings.} \\ a \times m &= (e \times c) + (m - e) \times b, \text{ therefore } a m = e c + m b - e b, \therefore a m - e b = e c - e b, \text{ therefore } m(a - b) = e(c - b). \end{aligned}$$

$$m = \frac{e(c - b)}{(a - b)} \quad (4)$$

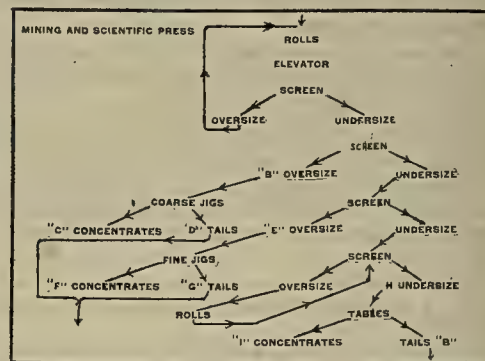
$$\begin{aligned} \text{From equation (1) extraction \%} &= \frac{(e \times c)}{(m \times a)} = \\ &= \frac{ec}{a \frac{e(c - b)}{(a - b)}} = \frac{ec(a - b)}{ae(c - b)} \end{aligned}$$

$$\text{Therefore, extraction in \%} = \frac{c(a - b)}{a(c - b)} \quad (5)$$

In this last equation the weights have been eliminated and only three assay values remain to solve the problem. A Scobey automatic tailings sampler is to take the sample of the crude ore after it has been reduced to its treatment size, i. e., 30 mesh and in suspension in water. A second sampler is to take a like sample of the tailings. The concentrates will be sampled by quartering the accumulation of every fifth shovelful that is thrown into the storage bin.

It will be noticed that equation No. 4 gives the weight or tonnage in terms of the assay values.

When correct sampling is in vogue this equation may be put to useful services, as in the following very standard mill arrangement, in which ten daily samples properly taken may answer all possible questions that may at any time be made.



The ore going to the mill may be determined by

$$m = \frac{\text{weight "C" (assay "C" - assay "B")}}{(\text{assay "A" - assay "B"})} \quad (6)$$

The pulp going to the coarse jigs is known by changing the values and solving for

$$m = \frac{\text{weight c (assay c - assay d)}}{(\text{assay b - assay d})} \quad (7)$$

The pulp going to the fine jig

$$m = \frac{\text{weight f (assay f - assay g)}}{(\text{assay e - assay g})} \quad (8)$$

The pulp going to the tables

$$m = \frac{\text{weight i (assay i - assay "B")}}{(\text{assay h - assay "B"})} \quad (9)$$

The effect of different mesh trommel covering on the jigs may be accurately studied, primarily, in balancing the feed to the two jigs by comparing the equations (7) and (8); secondly, by watching the saving made by each one by comparing the extraction of each, as may be determined in the following equations:

The extraction for the mill, complete, would be

$$\text{Ext.} = \frac{"C" ("A" - B)}{A ("C" - B)} \quad (10)$$

The extraction on the coarse jig

$$\text{Ext.} = \frac{c(b - d)}{b(c - d)} \quad (11)$$

The extraction on the fine jig

$$\text{Ext.} = \frac{f(e - g)}{e(c - g)} \quad (12)$$

The extraction on table

$$\text{Ext.} = \frac{i(h - "B")}{h(i - B)} \quad (13)$$

While it is recognized that in records of this kind there will oftentimes be erratic conclusions resulting from mistakes that are sure to happen in both preparing the sample and assaying, these may be thrown out and the summation for any considerable time will develop the facts. Further, by applying the results of the assay in this manner, especially in deducing the tonnage going to the jigs, the work of assaying is constantly under check, as the sums of the tonnage going to the jigs must be less than the total tonnage of the mill by the amount of undersize going directly to the tables. Errors are thus shown up that might otherwise go unquestioned.

The quantity representing the assay value in the above formulas may be used to represent either a single metal or all the metals, and the saving on any single metal, or on all the metals, may be independently determined.

When the men understand that these things are being watched there will undoubtedly be less carelessness in the work, as any loss is sure to be immediately located, and if the records are kept for the separate work of the jigs and tables the men in charge of these machines may be held personally responsible for the bad work. When it is possible to assay the necessary number of samples per day, these samples may be taken at the end of each shift, and the work of the different foremen compared.

We are fully aware that this system is quite in advance of the present general practice, but the point is urged that science in all its branches is but the compiling of accurate facts resulting from minute measurements in both weights and measures.

High scientific attainment is only the use of the most delicate measuring instruments. Balances of the most delicate accuracy are now common in every mining camp, and it only remains to apply accurate sampling devices to enable ore milling to be placed on a thoroughly scientific basis.

A Plea for Greater Simplicity in the Language of Science.*

NUMBER II.—CONCLUDED.

By T. A. RICKARD.

Science has been well defined as "organized common sense." Let us, then, express its findings in something better than a mere jargon of speech and avoid that stupidity which Samuel Johnson—himself an arch sinner in this respect—has fitly described as "the immense pomposity of sesquipedalian verbiage." George Meredith, a great mint-master of words, has recorded his objection to "conversing in tokens not standard coin." Indeed, the clumsy latinity of much of our scientific talk is an inheritance from the schoolmen of the past; it is the degraded currency of a period when the vagaries of astrology and alchemy found favor among intelligent men.

Vagueness of language produces looseness of knowledge in the teacher as well as the pupil. Huxley, in referring to the use of such comprehensive terms as "development" and "evolution," remarked that words like these were mere "noise and smoke," the important thing being to have a clear conception of the idea signified by the name. Examples of this form of error are easy to find. The word "dynamic" has a distinct meaning in physics, but is ordinarily employed in the loosest possible manner in geological literature. Thus, the origin of a perplexing ore deposit was recently imputed to the effects produced by the "dynamic power" which had shattered a certain mountain. "Dynamic" is of Greek derivation and means powerful; therefore, a powerful power has done this thing; but in physics the word is used in the sense of active, as opposed to "static" or stationary, and it implies motion resulting from the application of force. In the case quoted, and in many similar instances, the word "agency" or "activity" would serve to interpret the hazy idea of the writer, and there is every reason to infer, from the context, that he substituted the term "dynamic power" merely as a frippery of speech. It is much easier to talk grandiloquently about a "dynamic power" which perpetrates unutterable things and reconstructs creation in the twinkling of an eye than it is to make a careful study of a region, trace its structural lines and decipher the relations of a complicated series of faults. When this has been done and a writer uses comprehensive words to summarize activities which he has expressly defined and described, then, indeed, he has given a meaning to such words which warrants him in the use of them.

In this connection it is amusing to remember how Ruskin attacked Tyndall for a similar indiscretion. The latter had referred to a certain theory which was in debate, and he had said that it, and the like of it, was "a dynamic power which operates against intellectual stagnation." Ruskin commented thus: "How a dynamic power differs from an undynamic one—and, presumably, also, a potestatic dynamic from an unpotestatic one—and how much more scientific it is to say, instead of that 'our spoon stirs our porridge,' that it 'operates against the stagnation of our porridge,' Prof. Tyndall trusts the reader to recognize with admiration."

Among geological names there is that comfortable word "metasomatosis" and its offspring of "metasomatic interchange," "metasomatic action," "metasomatic origin," etc. To a few who employ the term to express a particular manner in which rocks undergo change, it is a convenient word for a definite idea; but for the greater number of writers on geological subjects it is a wordy cloud, a nebular phrase, which politely covers the haziness of their knowledge concerning a certain phenomenon. When you do not know what a thing is, call it a "phenomenon." Instances of mere vulgarity of scientific language are too numerous to mention. "Auriferous" and "argentiferous" are ugly words. They are unnecessary ones, also. The other day a metallurgical specialist spoke of "auriferous amalgamation," as though any process in which mercury is used could be gold bearing, unless it was a part of the programme that somebody should add particles of gold to the ore under treatment. A mining engineer, of the kind known to the press as an expert, described a famous lode as traversing, "on the one hand, a feldspathic tufaceous rock," and "on the other hand, a metamorphic matrix of a somewhat argillaceous composition." This is scientific nonsense, the mere travesty of language. To those who care to dissect the terms used, it is easily seen that the writer of them could make nothing out of the rocks he had examined save the fact that they were decomposed, and that the rock which he described last might have been almost anything, for all he said of it; for his description, when translated, means literally a changed matter of a somewhat clayey-sandy composition, which, in Anglo-Saxon, is m-u-d-l. The "somewhat" is the one useful word in the sentence. Such language may be described in the terms of mineralogy as metamorphosed English pseudomorph after blatherskite.

Some years ago, when I was at a small mine near Georgetown, in Colorado, a professor visited the underground workings and was taken through them. He immediately began to make a display of verbal fireworks, which bewildered the foreman and the other miners whom he met in the mine—all, save one, a little Cornishman, who, bringing him a bit of the clay which accompanied one of the walls of the lode, said to him:

"What do 'ee call un, you?"

The professor replied:

"It is the argillaceous remnant of an antediluvian world."

Quick as a flash came the comment:

"That's just what I told me pardner." He was not deceived by the vapor of words.

Next consider the position of the reader. It is scarcely necessary at this date to plead for the cause of technical education and the generous bestowal of the very best that there is of scientific knowledge. The great philosophers of that new reformation which marked the era of the publication of "The Origin of Species," have given most freely to all men of their wealth of learning and research. When these have given so much, we might well be less niggardly with our small change and cease the practice of distributing, not good, wholesome, intellectual bread, but the mere stones of knowledge, the hard fossils of what were once stimulating thoughts. In the ancient world the Eleusinian mysteries were withheld from the crowd and knowledge was the possession of a few. Do the latter day priests of science desire to imitate the attendants of the old Greek temples and confine their secrets to a few of the elect by the use of a formalism which is the mere abracadabra of speech? Among certain scientific men there is a feeling that scientists should address themselves only to fellow scientists, and that to become an expositor to the unlearned is to lose caste among the learned.

It is the survival of the narrow spirit of the dark ages, before modern science was born. There are not many, however, who dare to confess to such a creed, although their actions may occasionally endorse it. On the whole, modern science is nothing if not catholic in its generosity. "To promote the increase of natural knowledge and to forward the application of scientific methods of investigation to all the problems of life" was the avowed purpose of the greatest of the philosophers of the Victorian era.

There are those who are full of a similar good will, but they fail in giving effect to it because they are unable to use language which can be understood. In its very infancy geology was nearly choked with big words, for Lyell, the father of modern geology, said, seventy years ago, that the study of it was "very easy, when put into plainer language than scientific writers choose often unnecessarily to employ." At this day even the publications of the geological surveys of the United States and the Australian colonies, for example, are occasionally restricted in usefulness by erring in this respect, and as I yield to none in my appreciation of the splendid service done to geology and to mining by these surveys, I trust my criticism will be accepted in the thoroughly friendly spirit with which it is offered. It seems to me that one might almost say that certain of these extremely valuable publications are "badly" prepared because they seem to overlook the fact that they are, of course, intended to aid the mining community in the first place and the public, whether lay or scientific, only secondarily. From a wide experience among those engaged in mining, I can testify that a large part of the literature thus prepared is useless to them, and that no one regrets it more deeply than they, because there is a marked tendency among this class of workers to appreciate the assistance which science can give. Take, for example, a sentence like the following, extracted from one of the recent reports of the U. S. Geological Survey: "The ore forms a series of imbricating lenses, or a stringer lead, in the slates, the quartz conforming, as a rule, to the carunculated schistose structures, touches occasionally breaking across laminae, and sometimes the slate is so broken as to form a reticulated deposit." This was written by one of our foremost geologists, and, when translated, the sentence was found to convey a useful fact; but is it likely to be clear to anyone but a traveling dictionary? A thoroughly literary man might know the exact meaning of the two or three very unusual words which are employed in this statement; but the question is: Will it be of any use whatever even to a fairly educated miner, or be understood by those who pay for the preparation of such literature, namely, the taxpayers? An example of another kind is afforded by a Tasmanian geologist who recently described certain ores as due to "the effects of a reduction in temperature of the hitherto liquefied hydroplutonic solutions, and their consequent regular precipitation." These solutions, it is further stated, presumably for the guidance of those who wield the pick, "ascended in the form of metallic superheated vapors which combined eventually with ebullient steam to form other aqueous solutions causing geyserlike discharges at the surface, aided by subterranean and irrepressible pressure." At the same time certain "dynamical forces" were very busy indeed and "eventuated in the opening of fissures"—of which one can only regret that they did not swallow up the

author as Nathan and Abiram were once engulfed in the sight of all Israel.

It will be well to contrast these two examples of exuberant verbosity, because the first befalls the statement of a scientific observation of value, made by an able man, while the second cloaks the ignorance of a charlatan, who masquerades his nonsense in the trappings of wisdom. Here you have an illustration of the harmfulness of this kind of language, which obscures truth and falseness alike, to the degradation of science and the total confusion of those of the unlearned who are searching after information.

Let the writer on scientific matters learn the derivation of the words he uses and then translate them literally into English before he uses them, and thereby avoid the unconscious talking of nonsense. If he knows not the exact meaning of the terms which offer themselves to his pen, let him avoid them and trust to the honest aid of his own language. "Great part of the supposed scientific knowledge of the day is simply bad English, and vanishes the moment you translate it," says Ruskin. The examples already given illustrate this. "Every Englishman has, in his native tongue, an almost perfect instrument of literary expression," so says Huxley, and he illustrated his own saying. Huxley and Ruskin were wide apart in many things, and yet they agreed in this. Ruskin proved abundantly that the language of Shakespeare and the Bible can be used as a weapon of expression keen as a Damascus sabre when it is freed from the rust of classic importations, which make it clumsy as a crowbar.

There is yet another reason against the excessive use of Greek-English words, in particular. Greece is not a remnant of extinct geography, but an existing land with a very active people and a living language. The terms which palæontology has borrowed from the Greek may be returned by the Greeks to us. And, as Ruskin points out, "What you, in compliment to Greece, call a 'Dinotherium,' Greece, in compliment to you, must call a 'Nasty-beastium,' and you know the interchange of compliments can't last long."

In all seriousness, however, is it too much to ask that all such technical terms as are considered essential shall not be used carelessly, and that in publications intended for an untechnical public, as are most Government reports, an effort be made to avoid them, and, where unavoidable, those which are most likely to be understood shall be translated in footnotes? Even as regards the transactions of scientific societies, I believe that those of us who are active members have little to lose and much to gain by confining the use of our clumsy terminology to cover ideas which we cannot otherwise express. By doing so we shall contribute, I earnestly believe, to the advancement of science, which we all have at heart.

The words which, at first, are the exclusive privilege of the specialist, gradually extend into wide use, following in the wake of that diffusion of scientific knowledge which is one of the objects of this Association. We believe that to get alongside of facts to apply the best knowledge available, to seek the truth for its own sake, it is as essential to the well being of the individual life as it is to the success of a machine shop, and as beneficial to the community as is a smelting works.

In furtherance of this principle we must remember that language in relation to ideas is a solvent, the purity and clearness of which affect that which it bears in solution. Whewell, in "The Philosophy of the Inductive Sciences," has expressed this view of the matter with noble eloquence. "Language," he said, "is often called an instrument of thought; but it is also the nutriment of thought, or, rather, it is the atmosphere in which thought lives; a medium essential to the activity of our speculative powers, although invisible and imperceptible in its operation; and an element modifying, by its qualities and changes, the growth and completion of the faculties which it feeds."

In considering this subject from this standpoint, there is borne in upon the mind a suggestion which carries our thought far beyond the confines of the matter under discussion. Such power of speech as man possesses is a faculty which appears to divide him from all other living things, while at the same time the imperfection of it weighs him down continually with the sense of an essential frailty. To be able to express oneself perfectly would be divine, to be unable to make oneself understood is human. In "Man's Place in Nature," Huxley points out that the endowment of intelligible speech separates man from the brutes which are most like him, namely, the anthropoid apes, whom he otherwise resembles closely in substance and in structure. This endowment enables him to transmit the experience which in other animals is lost with each individual life; it has enabled him to organize his knowledge and to hand it down to his descendants, first by word of mouth and then by written words. If the experience thus recorded were properly utilized, instead of being largely disregarded, then man's advancement in knowledge and conduct would enable him to emphasize, much more than is permitted him at present, his superiority over the dumb brutes. Considered from this standpoint, language is a factor in the evolution of the race and an instrument which works for ethical progress. It is a gift most truly divine, which should be cherished as the ladder which has permitted of an

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ascent from the most humble beginnings, and leads to the heights of a loftier destiny, when man, ceasing to stammer forth in accents which are but the halting expression of swift thought, shall photograph his mind in the fullness of speech, and, neither withholding what he wants to say nor saying what he wants to withhold, shall be linked to his fellow by the completeness of a perfect communion of ideas.

Galvanizing and Recovering Galvanizing Wastes.*

The trade term "galvanizing" relates to the coating of iron with zinc. In order to do this the iron article to be coated must first be surface cleaned from all dirt and other impurities, so as to present a perfectly clean metallic surface. If any dirt, scale or oxide remains on the surface the zinc will not adhere to that part, and imperfect work will be the result. This cleaning is done by immersing the article in a bath of sulphuric acid and water, well washing in water, plunging in hydrochloric acid for a short time and drying. The article is then put into the bath of molten zinc. If sheets, or similar articles that will not hold much water, are being coated, the drying may be dispensed with to advantage. The galvanizing tank, or bath, as it is called, is of necessary size for the articles to be submerged, varying from one-half ton to thirty tons capacity.

This tank is usually oblong in shape and is divided on its surface, by a longitudinal partition, into two parts. On one side of the division ammonium chloride is placed, which will dissolve the oxide of zinc on the surface or prevent its formation. The other side of the bath is kept clean by continually skimming off the oxide of zinc as fast as it forms. In this skimming of the pot considerable shot metal is unavoidably removed with the oxide. The side with the sal ammoniac soon becomes covered with a thick black scum, which consists of the dissolved oxide, which has partly decomposed the ammonium chloride and formed a double chloride of zinc and ammonium.

The sal ammoniac must be fed continually to the top of the pot so as to keep the surface of the molten zinc clean and free from oxide, or else the oxide will adhere to the iron surface and affect injuriously the finished product by leaving spots uncoated with zinc.

By the continued addition of sal ammoniac the scum accumulates on the top of the pot and soon gets too thick for the workman to push his plates or other articles through, so a portion is removed from time to time. This yields on one side a waste called sal ammoniac skimmings and on the other side zinc oxide or zinc skimmings.

Yet another by-product is made that is called zinc slab dross. This is formed by the continued washing away of a portion of the iron that is being galvanized, for zinc in a molten state will alloy with iron, so that as soon as the iron becomes as hot as the bath its surface begins to dissolve in the zinc. If from accident or design a piece of iron is left in the bath after this dissolving process commences, it will in time be entirely dissolved. We often find bolts, nails, castings, etc., from the bottom of the bath that are nearly all, as it were, eaten away or dissolved in the zinc.

This addition of iron to the bath forms an alloy of iron and zinc that is of greater specific gravity than the zinc itself, and which falls to the bottom of the bath. If the bath is run hot it collects very fast, but under ordinary circumstances a bath of the usual size for pipes or sheets will make a ton of this dross in a week.

In order to have depth enough to do the work properly, the dross must be removed. This is usually done every Saturday afternoon. A large spoon is used, perforated with holes to allow the zinc to drain out, and the semi-fluid dross is pasted into moulds, smoothed off with a shovel, and is then the slab dross of commerce.

Thus it appears that we have three by-products: Sal ammoniac skimmings from one side, zinc oxide or zinc skimmings from the other, and slab dross from the bottom of the bath.

SAL AMMONIAC SKIMMINGS.—In 1871 there was no use for the sal ammoniac skimmings and it was thrown away. I found by leaching these skimmings with hot water and steam that I got all the zinc chloride and ammonium chloride in solution. This I evaporated down and recrystallized for use again on the bath. The residue, after washing with water and drying, I found to contain zinc oxide, with some little dirt and shots of metallic zinc. I placed this in a tumbler, or octagon-shaped barrel, with the joints not very tight. After revolving for some time all the lumps were ground to powder and the metallic particles were clean and ready for melting on the top of a pot of molten zinc. The oxide, in the shape

it was in, was worth \$30 per ton to the makers of zinc white paint. The average yield was:

| | Per cent. |
|---------------------------------|-----------|
| Zinc..... | 20 |
| Ammonium and zinc chloride..... | 30 |
| Zinc oxide..... | 35 |
| Iron scale and dirt..... | 15 |

ZINC OXIDE SKIMMINGS.—This, as previously mentioned, consists of zinc oxide and shot metal. All that was needed was to place it in the tumbler or barrel before described and then melt the resulting shot metal, pouring into suitable ingots.

ZINC DROSS.—The third and most important residue is zinc dross, or zinc contaminated with iron. At the time I began working in this line the greater part of the slab zinc dross was sent to England. The then only known way of using it to advantage was to distil it in retorts just as zinc is originally made from the ore. I built a retort furnace and made very good commercial zinc, but the process was very costly. I found that the distilling cost from \$30 to \$35 per ton.

After much experimenting to find a less costly method, I found that cyanides answered the purpose admirably, but the cost was prohibitory. Sulphur and superheated steam were both good. I built a plant to treat the dross on a large scale and made a very simple furnace to superheat the steam and a tube for feeding the pot with chemicals. This furnace was the same as those now in use, except that they are now built much larger. I wanted to treat the molten metal with superheated steam and also wanted to use the cyanide and the sulphur. Accordingly I devised a method which readily overcame all the difficulties of their application. We all know that potatoes are composed largely of water, and that leather scrap is used in making cyanide, so I used a mixture of sulphur, potatoes and leather scrap, and introduced the mixture into the bath by means of an injector. This could be held under the molten metal and soon became hot enough to generate steam, distil the sulphur, and throw off the gases from the leather. The pot distils all it wants, the steam keeps the pot boiling, and about fifteen minutes cooks the pot of molten metal. After the pot is boiled it is necessary to allow it to settle awhile, the oxides coming to the top and the new iron and zinc compounds going to the bottom. After it has properly settled the good metal is bailed into moulds and the residue is dug out with a shovel.

Mining in Mexico.*

An advantage that the miner enjoys in Mexico is the remarkable liberality of the laws relating to his occupation. He is regarded as an individual who deserves special encouragement, for his enterprise gives employment to hundreds of thousands and injures no one. One immense item is the fact that the entire area of Mexico is open to exploration, except within the limits of pueblos or towns and on territory used for governmental purposes. Ownership of the surface of land does not carry with it title to the mineral wealth below, and anyone who discovers a deposit of mineral has the absolute right to denounce or file on it and carry on his mining operations, no matter who holds the title deeds to the top of the ground. He can also denounce a hacienda, or mill site, and whatever more may be necessary to conduct his business to the best advantage. If he needs wood or water, no grasping landlord can extort an exorbitant price for these prime necessities. If the miner and the landlord cannot agree on terms, the former notifies the latter that he has appointed Senor — to represent him in fixing rates. In eight days the land owner must nominate a like representative. These two, with the local Judge of the First Instance (Superior Judge), form a board of arbitration, which must convene, consider the case and render a decision within eight days, fixing legally the prices that may be charged. An appeal lies from this decision, but in the meantime the miner can go ahead and take wood and water at the figures named by the arbitrators. As a matter of fact, these decisions are scarcely ever appealed from, nor is it even necessary often to have recourse to boards of arbitration. The miner's remedy being speedy and decisive, arrangements are usually made without serious friction on either side; and it may be said here that a little of this summary way of dealing out justice might be copied in the United States to the general advantage of litigants. In other words, the miner holds the top hand at all stages of the game. In California, after he finds a mine, as like as not it will be rendered valueless because some unconscionable fellow owns the only accessible water and timber and will not allow him to use of these essentials except on terms that are practically prohibitive. Again, exploration in California is practically limited to the public domain, constantly lessening in area; for it is small comfort to find a mine on another man's land and receive only his thanks for your trouble.

Then you have a very efficient, cheap and contented class of laborers to deal with. The Mexican miner is industrious to the backbone, is native born to his trade, for his forefathers have worked in the same

groove for generations, and he is perfectly satisfied with his lot. There are no unions, walking delegates or strikes or friction between employer and employee, providing the former treats his men half way decent. He must pay them promptly, have some regard for life and limb about his works, and not attempt to overreach them too outrageously in general matters of business. When these plain conditions are disregarded, there is trouble of the passive kind and lots of it. That is, when a mine once gets a bad name by reason of ill treatment of its employees, you might as well try to move the Sierra Madre as induce a Mexican to work in it. Valuable properties have been compelled to close their works and keep them closed through the folly of their management in dealing with their men. But accord them fair treatment and they are as easy a lot to get along with as I ever met.

Recovery of Tin From Tin Plate Clippings.

Written for the MINING AND SCIENTIFIC PRESS by
JAS. W. WORSEY.

Chlorine, like sulphuric acid, is of great importance to the metallurgist, and, like it, is produced in quantity and cheaply by the improved Le Blanc process. There is scarcely any metal or metalloids that chlorine will not attack and dissolve; but it works best when brought in contact with the substance to be treated in the nascent state. All the noble metals can be acted upon by it, and even extracted from their ores—no matter how refractory—and good and clean results obtained, provided proper conditions be arranged beforehand for the particular mineral. There are many forms from which nascent chlorine can be readily obtained, as sodium chloride, hydrochloric acid, bleaching powder, and the like, and from these the chemist can select the most suitable for his purpose.

About eleven years ago my attention was directed to the recovery of tin from tin clippings. These clippings were in almost unlimited supply, ingot tin was costly, and iron commanded good prices. There were several small factories treating this refuse in a very crude fashion. The precipitated metal only tested 50%, and the iron, if not sold and used up at once, corroded all away. These serious drawbacks were overcome by me and the Mersey Metal Co., Ltd., was formed to work the process that I devised. Our works commenced operating and the first tin precipitate we made assayed over 98% and realized in the market £96 per ton. The iron—freed from tin—realized 20 shillings per ton more than the scrap cost. The plant consisted of a large wooden dipping tank, into which were put some seven tons common hydrochloric acid. We had also a wooden crate worked by a winch, with which we dipped the clippings into the acid, heating the latter by means of superheated steam. The tin dissolved off readily in about fifteen minutes, for a fair number of charges, but after the acid had combined with a good quantity of tin the action of dissolving was considerably slower, till over two hours were required to do the work of the fifteen minutes at the beginning. This was considerably improved by adding a ten-gallon carboy of strong sulphuric acid, and in practice enabled us to work over eighteen tons of tin clippings, which was one full week's work. The acid was now fully saturated with tin and the recovery of the tin was done by placing old galvanized iron in any form in the solution in separate wooden tanks made for the purpose. After diluting the liquor with water the tin floated on the surface and was collected and well washed in a filter press, afterwards mixed with pine sawdust and melted in a reverberatory furnace. The product was fine tin. The iron was dipped into a water tank after draining and the iron was then tilted into trucks for the copper precipitators, who gave it the preference to any other light iron of like price in the market. The liquor was then freed from iron by bleaching powder and the zinc recovered by sodium hyposulphite, was of very good color and worth some £30 per ton.

Later I made improvements in the process, involving changes in the plant and in the use of the reagents. The large acid bath is not required, the wear and tear of the appliances are very considerably reduced, and the iron—after stripping—is not so liable to easily corrode away. The improved plant can be erected anywhere and at a very moderate cost, and the needful reagent made on the ground, if sulphur can be obtained. It is an industry that will pay well, even better than working a Cornish tin mine, if only plenty of scrap and cuttings can be easily obtained. One of the most important things is a proper tank in which the solution of the tin can be properly effected. I found a very useful one in the shape of an old egg end of a boiler about 6 feet diameter and 8 feet long, and this I lined inside with oak 1 inch thick, properly fitted and jointed so as to protect the sides of the vessel from the action of the chemicals used during the treatment. This apparatus is so constructed that it can be tilted and emptied. In this tank is arranged a steam spray at the bottom in such a way that the steam is equally

* Condensed from JOSEPH RICHARDS in Jour. Franklin Institute.

* J. H. Wilkins in Modern Mexico.

distributed. The cuttings, etc., to be freed from tin are placed inside this machine up to say about 1 foot from the top, and covered by a weak solution of sulphate of sodium, which is heated by the steam, all the time it is running in, up to 160° Fahr. About two pounds sodium nitrate is added, and then say about two gallons common sulphuric acid. When the whole is thoroughly mixed one quart of sulphur dichloride (S_2Cl_2) is added, so as to reach to the bottom with it. The steam is now turned off and the reaction allowed to proceed for some twenty minutes, when the clippings may be examined, and if they are nearly clean a little more time and a little more steam—up to boiling—may be given. Sometimes an extra pint of this S_2Cl_2 may be needed, but very much depends upon the cuttings, and also upon the operator. When finished the tin solution is run off by decanting and cold water sprayed over the iron scrap to wash off any tin solution remaining. When the iron is considered cleaned it is removed and sent to the puddling or other furnace for the manufacture of iron bars or sheets.

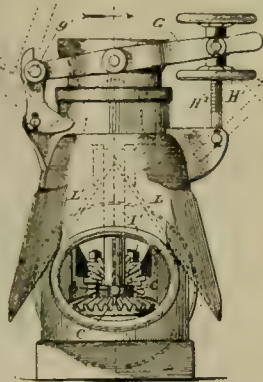
The washings are set aside for making up sulphate of soda solution, and the strong tin solution treated for the recovery of the tin and zinc, as above described. The average working of the plant showed over 2% tin on the clippings, and there should be no difficulty in turning out ingot tin 99% fine if this scheme be properly followed.

Mining and Metallurgical Patents.

Patents Issued September 9, 1901.

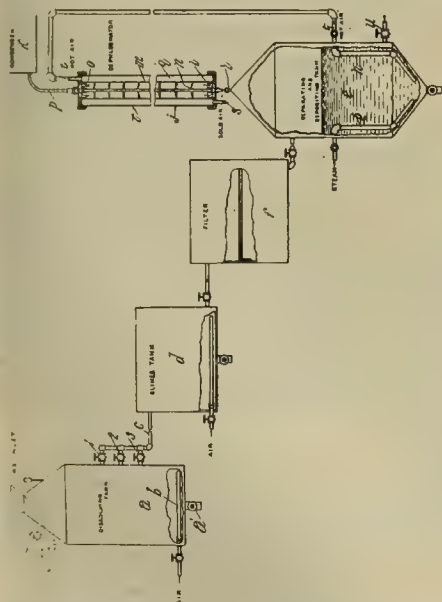
Specially Prepared for the MINING AND SCIENTIFIC PRESS.

ROCK AND ORE PULVERIZER.—No. 682,170; T. W. Capen, Chicago, Ill.



A frame portion, a vertical operating shaft provided with a crushing head, crushing ring concave mechanism surrounding crushing head between which elements material may be fed and ground, and lever mechanism for holding crushing ring concave mechanism in operative position and entirely removing and holding ring without the operative sphere of head.

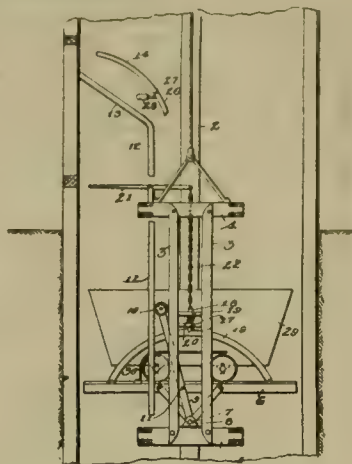
PROCESS OF PRODUCING METALLIC OXIDES FROM COPPER ORES BY AMMONIUM SOLUTIONS.—No. 682,232; D. A. Beck, Goodsprings, Nev.



Production of metallic oxides from copper ores by ammonia solutions, process by decomposing a cupro-ammonia solution, by subjecting solution to simulta-

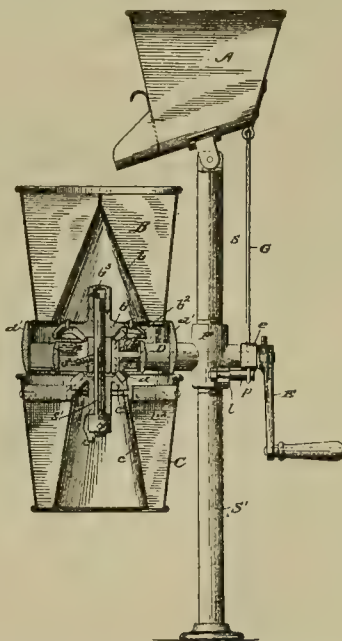
neous action of steam and hot air; collecting and condensing ammonia, and cooling steam and thereby condensing it after decomposing process and before ammonia is condensed.

DUMPING CAGE FOR MINES.—No. 682,525; B. Brantingham, Hocking, Iowa.



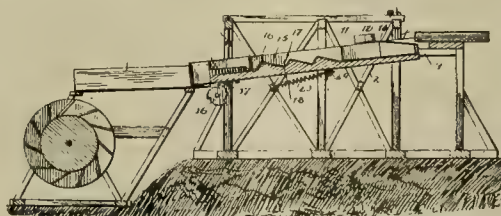
A tilting platform, centrally pivoted on cage, a shaft mounted in bearings on cage constituting pivotal bearing of platform, of guide rails having each an inclined portion at its upper end, a curved rail located above each inclined portion, an arm secured at one end to each end of shaft and intermediate, its ends being secured to platform, and a wheel mounted on opposite end of each arm, and located between guide rail and one shoe of cage and adapted to engage the under side of curved rail in upward movement of cage.

ORE SAMPLING MACHINE.—No. 682,528; A. C. Calkins, Los Angeles, Cal.



A frame D supported at one side and having a central vertical shaft s' , in combination with a bevel gear b' , with closed hub b^3 and pendant covering flange b^2 and a surmounting bucket having radial partitions and bottom, openings and a driving gear wheel housed and covered by flange b^2 .

COMBINED GOLD WASHER AND AMALGAMATOR FOR PLACER MINING.—No. 682,545; W. L. Harraman, F. O. Chapman, C. Severin and D. H. Brown, Grand Junction, Colo.



A longitudinally vibrating flume having an amalgamating bottom provided with mercury-holding pockets located at intervals along its length, flume having its sides converged at its delivery end, a series of transverse, closely juxtaposed, parallel slats constituting amalgam-catching riffles disposed between converged sides of flume, a screen carried by flume at upper or receiving end, above flume bottom, and adapted to receive material prior to enter-

ing flume, screen being inclined upwardly from its receiving to its opposite end, whereby material is retarded in its forward motion on screen, and an annular divider located at higher end of screen with its apex directed thereto, divider being adapted to divert coarse material laterally from screen and over sides of flume.

The Bromo-Cyanogen Process.

The application of the bromo-cyanogen process may be considered as technically divisible into (1) preliminary mechanical treatment of the ore preparatory to (2) second stage of the process, where the reagents are employed and the metal recovery made. The most complete published technical data of the actual operation of the process that is available for comparison is taken from the operation of the Deloro mine in Ontario, Canada. There the ore consists of quartz containing mispickel, some copper pyrite and frequently a large per cent of pyrite, and the treatment scheme provides for the recovery of both the gold and the arsenic. The following only deals with the handling of ore containing mispickel. The mine run ore is first hand sorted and the white quartz known to contain little or no value is returned to the mine for vein filling. The ore is crushed in a stamp mill with water through a No. 40 burr slot screen. Amalgamation is done in the battery and on outside plates, care being required here on account of the presence of the mispickel. The tail pulp from the plates passes to vanners. The vanner tails go to hydraulic classifiers and are run thence in coarse, medium and fine grades to three more vanners. The tails from the second set of vanners are found to carry only 2% to 2½% of the gold, and 0.5% of the mispickel of the ore, and are wasted. The concentrates are treated by the bromo-cyanide process. The plant used consists of four solution tanks on the floor above the leaching vats; three small steam pumps for pumping liquors; three sump tanks (forty-gallon barrels); two fifty-gallon barrels holding stock solution of cyanogen bromide; one Sulman's cone for the use of zinc fume for precipitation; one settling box connected with cone; one zinc box for running drainings of vat charges through. The pipe and clean-up plant are the same, with minor detail modifications, as usual with cyanide treatment plants. The wet concentrates as received from the mill consist principally of mispickel, some pyrite with small quantities of copper and 15% to 20% of silica-quartz sands—which are purposely retained to aid the leaching of the dense concentrates. The results of mixing all the grades of sized concentrates were better than obtained by separate treatment. The wet concentrates, together with a small quantity of caustic lime, are dumped into the leaching vats to a depth of about 3 feet, a vat charge approximating forty tons. Samples are taken from twenty to thirty 2-inch drill holes the full depth of the vat charge. The charge is first given a short water wash to take out soluble salts, formed in the wet mass by exposure to the air. After partial draining, the cyanide solution, together with the cyanogen-bromide solution, is run in. This is the strong liquor solution. The remaining wash water draining out is run through the zinc boxes. On the first appearance of gold-bearing solution, it is switched to the strong solution tank. This solution or strong liquor is used again and again without precipitation till it contains as much as six or seven ounces of gold to the ton. It is regarded as advantageous to precipitate this solution as infrequently as possible, as zinc decomposes cyanogen-bromide and the liquor is rendered less active. In the strong solution tank the switched solution, weak in KCy, is brought up to correct strength by adding it. In twenty-four hours it is found that 60% to 70% of the gold is in solution. The charge is drained and the charge reshoveled to expose fresh surfaces. Strong liquor is again run on till extraction is complete. A weak solution is then used for working and, the original thirteen tons of strong solution recovered, the stream is switched to the weak tank. The weak is then collected till sample shows it can be wasted, and the final wash water is then run through the zinc boxes. The weak solution, used several times, is always precipitated ahead of the strong. The liquor to be precipitated is run through the fume in the cone from the apex upward and overflows, freed of gold, into the settling box, thence, clear, to the sumps. The consumption of chemicals is found to be, per ton of concentrates treated: KCy, 2 pounds; cyanogen-bromide, .5 pound; zinc fume, 0.19 pound. Time of treatment, 80 to 100 hours. Extraction of gold, average 90.5%.—Condensed from P. Kirkegaard and S. B. Wright in Journal of Canadian Min. Inst.

In a recent issue of Le Genie Civil is published a short note describing a machine for increasing the oxygen content of air before using it in furnaces. The machine is said to be due to M. Mazza, an Italian engineer, and is merely a centrifugal separator. On passing air into this centrifugal machine the oxygen molecules, being heavier than the nitrogen ones, tend, it is stated, to concentrate at the periphery of the machine, and on drawing off the air at this surface it is found to be considerably richer in oxygen than normal air. In fact, the oxygen content can, it is said, be readily brought up to 26% of the total. Common air, it will be remembered, contains but 23.2 parts by weight of oxygen. The centrifugal machine used acts at the same time as a blowing fan, the enriched air being delivered under a slight pressure, while the impoverished air is drawn off continuously from near the center of the machine. About 2 H. P. is needed, it is stated, to operate a separator capable of delivering 18,000 cubic feet of enriched air per hour. This enriched air has been used for supplying the furnaces of a boiler, and has led, it is stated, to an increase of water evaporated per pound of coal from 9.5 pounds, with natural draft to over twelve pounds with the Mazza apparatus.

MINING SUMMARY.

Specially compiled and reported for the
MINING AND SCIENTIFIC PRESS.

ARIZONA.

GILA COUNTY.

Manager G. P. Andrews, of the Pinal Copper Co., reports at Globe that a new body of high-grade ore has been opened up on the lower level of the Black Copper mine.

A. C. Sieboth, superintendent of the Welch mine, owned by the Pinto Creek Copper Co., of Hancock, Mich., is sinking a double compartment shaft 250 feet. A road is to be built to the mines.

The Buckeye M. Co., of Cincinnati, Ohio, are preparing for the operation of their mine, in the Dos Cabezas mountains, near Bowie Station. Mr. Todhunter, of Cincinnati, is superintendent, and W. J. Larsen, formerly of Globe, is foreman.

GRAHAM COUNTY.

Tunnel No. 1 of the Standard, at Clifton, has cut a 2-foot vein of copper glance, from which a large amount of rich ore is being taken. The Standard now has glance ore averaging from 40% to 50%, and from 18 inches to 2 feet in width, in three different workings, besides second-grade ore averaging from 15% to 20%.

The Shannon mine at Clifton continues to show large high-grade ore bodies. W. T. Thompson, financial agent of the company, states that the strike of sulphide ore made in the Harrison tunnel runs 5.4% copper, and is a continuation of the great red West ore body, which in the Shannon tunnel, 70 feet above, is an oxidized ore, and on this level has changed to a sulphide ore.

MOHAVE COUNTY.

The machinery for the concentrating plant at the C. O. D. mine near Kingman is on the ground and it is expected that the new 100-ton plant will soon be in operation. The machinery for crushing consists of high speed steel rolls of large diameter, crushing wet. The product will then be sized by trommels and concentrated.

PINAL COUNTY.

F. M. Pool, J. H. Pool and J. L. Storry, all of Schultz, who own a copper mine in the Canada del Oro, have given the Eureka Dev. Co., of Calumet, Mich., a twelve months bond on the property, and the company has commenced development work. The general average of the ore exposed is good and one vein carries a small streak of 20% ore.

SANTA CRUZ COUNTY.

One of the oldest mines in Arizona is the Mowry, at Mowry camp, which has been worked since 1852. In the early 60's Col. Mowry of the U. S. Army bought it and sold lead to the Confederacy for making bullets, for which the Government confiscated the mine. The mine is owned in Tucson and is superintended by E. J. Gilbert. The ore is assorted into shipping grade, sent to the smelter direct, and a lower grade, which is concentrated at the mine before shipment.

YAVAPAI COUNTY.

The Summit mine, on the divide between Groom creek and the Hassayampa, has been bonded by Darrah & Stukeley of Walker. The main shaft, which is now down 90 feet, will be sunk several hundred feet deeper. M. Murphy, formerly of the Penn. G. M. Co., has been appointed superintendent of the mine.

At the Verde Con. C. M. Co.'s mine, near Jerome, the new shaft is developing ore assaying 3½% copper and \$6 gold per ton.

At the Monarch G. & C. M. Co., development work on the strike of the new shaft on the eclipse claim is producing ore going \$50 in gold, which is now being milled.

ARKANSAS.

BOONE COUNTY.

S. Nathan, formerly of Cripple Creek, Colo., states in Denver of the Arkansas zinc mining field: "It is a new old country, in that zinc has been found there for years; but the native is slow and poor, and experienced mining men must have ignored the possibilities of the fields, which are 20 miles from a railroad. The veins run in blankets and fissures, and some of the shafts are down 300 feet, but from 50 to 100 feet is the average depth. The Alma M. Co. is taking out \$100 a day and has its own mill. Other mills have been built and are going up. The veins run from 10% to 50% in zinc."

CALIFORNIA.

AMADOR COUNTY.

The east shaft of the Kennedy has been sunk to 2400 feet. At the 2100 level connection has been made with the workings of the west shaft. The east shaft will be continued down. The company plans to

erect a new 80-stamp mill near the east shaft next summer, believing both it and the present 40-stamp mill can be kept supplied with ore for an indefinite period. The ore body is 100 feet wide in places, of low grade, but paying.

At the Argonaut mine the shaft is down 1850 feet and is being deepened.

The mines near Jackson and Sutter Creek using petroleum fuel have storage provision for oil to carry over the winter season. The contract with D. McCall, who delivers oil to the mines, has required each mine to erect storage tanks capable of holding sufficient fuel to last 100 days. The Oneida has a tank to hold 2400 barrels, the Kennedy 1500, and the South Eureka and Lincoln 1200 barrels each. The mine owners continue to be well satisfied with oil as fuel.

BUTTE COUNTY.

The Pershbaker or Magalia drift mine at Magalia, it is reported, will be reopened by Steifer Bros., who have bought the claim north of it, and will buy the old plant to work through the old shaft and tunnel.

The Henderson mine at Wyandotte continues to prospect well.

CALAVERAS COUNTY.

It is reported that a rich strike has been made at the Duchess mine, near Vallecito, and that extra men have been put on duty and the ore is being sacked up and guarded. The Duchess mine is owned by an Eastern company and W. E. Emery is the superintendent and manager. The mine is situated on the north side of the Stanislaus river directly opposite the Dunsmore mine, in Tuolumne county. A large mill will soon be in readiness to run on the Duchess.

At the Melones mine, at Robinson's Ferry, the ore bin at the new mill is finished and the framework of the mill building is being put up. Work on the dam has reached a stage that no danger is now anticipated from high water.

A company has been formed to buy the Prince mine at Altaville, which will then be unwatered and the shaft sunk deeper.

The Oriole M. Co. stockholders' meeting in Stockton elected H. Hildreth president and J. B. Frietas secretary. The work at the mine near San Andreas is being done at the fourth and fifth levels.

A debris restraining dam on O'Neill's creek, near San Andreas, has been completed by W. Coulter, the engineer in charge.

C. W. Getchell and M. Donnallan own an extension of the Sheep Ranch ledge on the southeast. A tunnel is being run in the lead and 100 feet more heading is expected to take it into a large body of ore.

EL DORADO COUNTY.

J. McGraw of Kelsey reports \$1000 as the result of a cleanup of a month's run at the McGraw mine at Kelsey. This mine is equipped with a 5-stamp mill. B. L. Peters is superintendent.

The Burnham mine, near Placerville, has been bought by G. W. H. Master. The mine is equipped with a Huntington mill.

The new 20-stamp mill at the River Hill mine, near Placerville, is in operation. The stamps weigh 1200 pounds each. At present ore is taken from the Gentle Annie mine. The frame for the new hoist at the River Hill is in place but the new shaft is being sunk yet with the small hoist. It is down over 400 feet and it connected with the older works at the 400-foot level of the Gentle Annie shaft.

INYO COUNTY.

The old Panamint mine, that has been closed down for twenty-five years is to be reopened. It is located at an altitude of 10,000 feet on Telescope Peak, over the range from Death valley. The equipment of the mine consists of a smelter, a 200 H. P. engine, two 200 H. P. boilers, an assay plant, several discarded 10-stamp batteries, one good one. The property was bought at Sheriff's sale to satisfy an indebtedness for delinquent taxes of \$5000 or \$6000 by a Mr. Pedley. The latter has appointed Mr. Stebbins of Ballarat as manager. Concentrators have been put in and the concentrates will be treated on the ground; a crusher is also being installed. The roads leading to the mine have been repaired.

MONO COUNTY.

At the Sweetwater Con. mine, near Bridgeport, the boiler and engine are in place, and the battery and rock breaker are being set up. The mill, which was badly wrecked by a cloudburst, will be in shape for operation early next spring.

NEVADA COUNTY.

The Cold Spring, Fountain Head and other gravel mines on Washington ridge have been bonded to a San Francisco company, headed by R. I. Thomas. It is expected that the promoters will put in considerable machinery for development.

The Kentucky mine on Kentucky flat, near Nevada City, is being developed by

Kohler & Smith, who have run a tunnel 120 feet along a 16-inch ledge which is estimated to go about \$15 to the ton. The owners hope to erect a stamp mill next spring.

Work at the Coe mine, near Grass Valley, has been suspended and the property may be closed down.

Mill tests made on rock from the Bonnie Bee, near Emigrant Gap, show for one ledge 4 feet in width \$7 per ton; for another 6 feet wide \$26 per ton, and for the third, a 12-foot ledge, \$42 per ton. According to trials the concentrates go 5% and pay \$206 per ton. The company has worked sufficient ore in a 4-stamp mill to pay running expenses for almost a year, but is now contemplating the erection of a 12-stamp mill.

A mine is being developed near You Bet by C. W. Jones and H. W. Gendar of Grass Valley and J. Goodwin of You Bet. They recently took an old shaft 47 feet deep, retimbered it, and cleared out the water. Since then they have extended the shaft and uncovered a ledge 17 inches in width, the ore assaying from \$18.82 to \$72 per ton. The rock carries about 3% sulphurets.

C. Weisenburger has started to erect hoisting and pumping works on the Posey mine, in Willow valley, near Nevada City, which was recently bonded by a company represented by W. H. Bray. The machinery will be entirely new, except the pumping plant will be taken from the Miliken mine on the Washington ridge.

The Eureka mine on Gold Flat, near Nevada City, idle for eight years, has been bonded by R. Simmons Jr. and J. Poyer to a Mr. James of Los Angeles, who, it is said, intends to put on hoisting and pumping machinery. B. Hoskins of Los Angeles will be Supt.

R. M. Donne and C. M. Root are arranging to begin operations on the French quartz mine, near Moore's flat.

The annual stockholders' meeting of the Mount Blanc Gravel M. Co. at Grass Valley elected D. B. Marwick president, J. Watt treasurer and A. B. Brady secretary. The company's mine is at North Bloomfield.

PLACER COUNTY.

The Sailor Con. M. Co. of San Francisco is developing the Sailor drift mine at Canada Hill. The new tunnel is in about 420 feet and has passed through 50 feet of good looking gravel in the bottom of the channel. The company owns patented ground and claims covering 480 acres. N. A. Harris of San Francisco is president of the company and W. Duffy is Supt. in charge of the mine.

The Hathaway quartz mine, near Newcastle, is working twenty men. The mill is running steadily. The main shaft is 815 feet deep. A. B. Eastwood is Supt.

The channel of the Gray Eagle mine has been rediscovered in the Wolverine claim of the Anthony Clark group, adjoining, and it is said is paying \$10 a carload. W. H. H. Hart of San Francisco is prospecting the mine under a bond. T. G. Durning is the Supt. The discovery is 25 feet below the tunnel level.

PLUMAS COUNTY.

Gravel has been struck in the lower tunnel on the West Elizabeth mine on Poplar creek, near Quincy, by R. R. Gumbert. The gravel is reported to be rich enough to pay well for drifting.

SAN BERNARDINO COUNTY.

A rich strike is reported made in the mine of the Ludlow M. Co., Buckeye district, San Bernardino. In the last 8 feet of the tunnel a large ledge of pay ore has been struck. E. H. Staggs of Randsburg is one of the owners.

SHASTA COUNTY.

Supt. A. A. Anthony of the Central gold mine, at Old Diggings, has been ordered by Whitehouse & Bliss of New York to reopen the property and commence expensive development. The mine, which has produced more than \$100,000, has been idle for a number of years. The ore will be shipped to Keswick to be smelted.

The Rossman group of copper claims near Stillwater has been bonded at \$25,000 by J. S. Jennings to Eastern capitalists. The claims are owned by R. H. Rossman, Mrs. W. Obst, T. Jaegal and G. Bauer of Redding.

J. Lawyer and H. Thompson have taken a year's lease on the Reid mine, at Old Diggings, and will ship ore to Keswick.

The Brush Canyon group of eight claims, near Copper City, owned by W. Ellis, J. W. Snell, P. Sheehan and J. L. Cannon of Copper City, have given Mr. Cannon and R. Small of Redding a year's option of purchase at \$20,000. It is said that the property is to be handled through W. F. Mitchell of Salt Lake City, Utah.

SIERRA COUNTY.

An increased flow of water has been struck in the shaft at the Belcher mine, near Downieville, forcing the abandonment of sinking until a larger pump can

be put in. The tunnel is being driven ahead with two shifts.

Development work at the Dudley mine, situated at Forest, worked under a bond by Los Angeles people, is being rapidly pushed. H. Murray of Los Angeles is Supt., and H. M. Bradbury of Forest foreman.

SISKIYOU COUNTY.

The Flag mine, near Yreka, operated by B. Kinyon, is showing a fine body of high-grade ore, which will be milled in an arrastra.—The Craggy mine, operated by Nutter & Elliot, is developing a vein of good paying ore.—The old Knapp mine has been opened and is being operated by J. Locke and B. Fairchild of Yreka.

F. Mahler is seeking to secure the Yreka Creek valley, between the southern boundary of Yreka and the Blue Gravel mine on Greenhorn, to put in a dredger. The work is to be undertaken by Eastern capitalists, for whom Mr. Mahler is acting.

TRINITY COUNTY.

C. D. Galvin, managing owner of the Galvin Dredging Co., at Weaverville, has started work on the Ajax mine on Oregon mountain. It comprises 1800 acres and adjoins the Sweepstake, being its extension southward.

TUOLUMNE COUNTY.

J. T. Newcomer has sold to A. Elliot a half interest in the Newcomer mine, Knights creek, near Sonora.

C. Atherton and J. Bartlett have taken out an \$8000 pocket from the mine near Jackass Hill, Tuttle town, which they are working under a lease from A. Vincent.

At the Mt. Hood mine, near Tuttle town, eleven men are at work. A road is being built to the mine. An engine and boiler will be put in when the road is completed, and sinking will be commenced. The property is owned by San Jose people. J. Burkhart is Supt.

At the Badger mine, near Rawhide, on Bear creek, eight men are sinking and retimbering an old shaft. G. Stayton is Supt. and W. Kahl foreman.

The Clio mill, at Jacksonville, has been shut down and work in the main shaft has ceased. Three shifts are engaged in running a tunnel to connect with the old works. The abandonment of work in the main shaft is said to be due to the shifting character of the surrounding ground.

The Mountain Water & Electric Co. has been incorporated to supply water and electric power from the Tuolumne river for mining and irrigation. The Board of Directors are: J. M. Castle, J. P. Spooner, F. R. Clarke, W. B. Harrison and L. A. Richards—all of Stockton. They own a large gravel mine at Philadelphia Diggings.

YUBA COUNTY.

The Last Chance M. Co. has been incorporated at Marysville; capital \$25,000. M. Sullivan, J. C. Lumbard, W. H. Carlin, M. A. Nurse, O. G. Hopkins and A. D. West are the directors.

COLORADO.

ARAPAHOE COUNTY.

The Brock M. & M. Co. has been incorporated by H. D. McMaster, R. S. Brock and F. M. Young of Denver. The capital is \$1,500,000.

BOULDER COUNTY.

At the annual stockholders' meeting of the Leviathan M. Co. at Denver E. E. Ives of Emporia, Kan., was elected president and F. W. Sears of Denver secretary, treasurer and general manager. The Leviathan M. Co. owns a tunnel claim in Ward mining district, situated near Camp Talcott, which will cut seventeen lodes owned by the company, besides the Ward-Rose, Puzzler, Chief and other producing veins in Saw Mill mountain. Good ore has been opened in a blind vein. It is proposed to equip the tunnel with a plant of machinery, including power drills.

The Slide, at Wall Street, owned by W. Teller, J. S. Sanderson, and the Seymour heirs, is being worked by leasers. Wilson & Andrews took a lease on one of the Slide levels, paying 33½% royalty, and in two weeks made \$1100 each clear. An 18-inch streak of ore went \$200 per ton in carload lots. The mine is down altogether 1100 feet, and at that depth is in a sulphide ore which runs \$18 to \$25 in a crude state. The work is now principally in the 800 and 700-foot levels. Some ore is sacked which goes \$600. About fifty tons of ore are shipped per month.

CLEAR CREEK COUNTY.

The Good Enough M., M. & T. Co. has secured from A. Shepard control of the Eclipse tunnel and the Gold King, Gold Prince, Homestead and Little Winnie lode, near Georgetown. The company is incorporated for \$500,000 and its officers are M. L. Chapman president, F. C. Adams secretary and treasurer, and C. W. Badgley general manager, all of Denver. Work will be started at once on the Eclipse tunnel, which is now in 800 feet, and will be driven ahead to the Gold

King vein, which it will cut at depth of 600 feet from the surface.

J. E. Wallis of Boston, Mass., has taken up the bond on the Morning Star mine for the Abbandwal Co. J. Owen, the owner, has been appointed manager. It is the intention to put on a plant of machinery to work in the surface pocket, also in the Newhouse tunnel.

The Ann Rutledge G. M. Co. has been incorporated at Denver and will work the North Star lode in Vermillion district. It is reported that a plant of machinery will be put on the property before the bad weather sets in, so that developments can be kept up all winter.

During the first week of September the shipments of ore and tailings from this county for treatment amounted to 1369 tons.

A strike has been made in the Commonwealth mine, in East Argentine, owned by the Waldorf M. Co. From 3 to 4 feet of ore has been opened out which will run from 200 to 300 ounces silver and about an ounce in gold per ton. The mine is being reopened after an idleness of several years.

Four feet of ore that will run five ounces gold per ton is reported opened up in the Centennial mine, in Georgetown. The Centennial is strictly a gold mine, and has produced nearly a half million dollars. It is now being operated by Boston people, with S. G. Evans manager.

W. H. Smith of Denver confirms the sale of the Edgarden mine, at Idaho Springs, to R. B. Ragland and associates. This property is on the Newhouse tunnel, and where out there is a vein of 6 feet of ore. The mine has a steam hoist, and it is intended to contract with the tunnel owners for development of the lode through it. The shaft is down about 300 feet.

CHAFFEE COUNTY.

Turret camp has a strike of copper and gold ore in the Independence mine showing 10% to 30% copper and \$6 to \$12 in gold. The owners are sinking a shaft.

The Vivendur mine is yielding ore that will run more than \$130 per ton. Placer gold has been discovered at the postoffice in Turret. In putting down a driven well the core was taken from the pipe and panned, showing gold.

GILPIN COUNTY.

Two shifts are sinking the O'Neill shaft, near Central City, now 610 feet deep, and the intention of the management is to sink until a depth of 1000 feet has been reached. The property is operated by the Ontario & Colorado G. M. Co. with H. C. Eastman as Supt.

HINSDALE COUNTY.

(Special Correspondence).—The Ute & Ulay, on Henson creek, is now the property of the Auric M. Co., of which S. D. Nicholson is manager, the interests of English holders having been purchased by Colorado men. Within the last eighteen months a lower tunnel has been driven 2800 feet, crosscutting the Ute vein 300 feet below any of the upper workings, a connection having been made by an upraise. Another deep tunnel will soon be commenced on the opposite side of the creek, designed to cut the Ulay vein at great depth. The latter has never been extensively developed.

The Ute & Ulay mill, which makes jig and buddle products, turns out fifteen to twenty tons of concentrates per day that runs 65% lead, with considerable values in gold and silver. Manager Nicholson states that this tonnage will be increased. This mill was erected fifteen years ago; the erection of a new, modern mill is contemplated.

The new steam-boller plant here consists of three high-pressure tubular boilers, 150 H. P. each, with an automatic water flushing device for carrying away the ashes and cinders.

John McLellan of Leadville is on the ground putting in a 20-drill air compressor of Ingersoll-Seargent make. It will be a cross-compound, with high pressure steam cylinders 16x42, low pressure 30x42; and high pressure air cylinders, 16x42, and low pressure 28x42. The flywheel has 33-inch face by 16 feet diameter. It is so arranged that the steam cylinders may be disconnected in case water power shall be used. The intercooler is 48 inches diameter by 14 feet high. The capacity of the compressor is 2250 cubic feet of free air per minute.

Lake City, Sept. 9.

(Special Correspondence).—The Megunticook Gold & Copper M. Co. of Boston, Mass., has done considerable work on the Contention mine, on Hotchkiss mountain, including a 1300-foot tunnel, which goes in on the strike of the ledge.

The Golden Fleece tunnel, which starts from a point only about 50 feet above the level of Lake San Christoval, has been driven 3200 feet into Hotchkiss mountain, and is still being advanced with power drills. It has cut one vein and is expected to cut the main vein of the property about 50 feet

ahead. Supt. Kilvert states that upraises will be made on both veins to the upper workings, and then all ore will be handled through this lower tunnel and the concentrating mill started again.

At a point in the Golden Fleece tunnel, 2000 feet from entrance, a branch tunnel strikes northwesterly into the grounds of the Hotchkiss Mountain Mining & Reduction Co., whose mine is locally known as the Black Crook. The latter was first opened up through a system of tunnels and shafts at a higher point, but now most of the work goes on through this Crook-Fleece tunnel, though some shipments are still made from the upper tunnels. A connection will be made between the lower tunnel and the upper workings. The ores carry lead, gold and silver, and so far the product has been strictly a shipping ore.

Both the Golden Fleece and Black Crook use power drills and air compressing plants.

Lake Shore, Sept. 9.

LAKE COUNTY.

The Mingo G. M. Co. at Leadville propose to put a 30 H. P. steam plant on the Mingo mine in Lake district. The shaft on this property is down 180 feet and is to be pushed on down.

Colorado Springs parties who have a bond on the London at Leadville are doing development work and will, it is reported, put in a small gasoline plant on the mine to replace a whim hoist.

Sinking has been resumed at the Chicago-Carr mine at Leadville at a depth of nearly 300 feet and Manager B. M. Myers says he intends going down 100 feet.

Work at the Rialto mine at Leadville has been started again by the Ridgewood G. M. Co., B. P. Hammond manager. The work of lowering the water is about completed and the company has received a Jeanesville station pump, capacity 1000 gallons a minute, and which will be lowered to a depth of 600 feet as soon as a station can be cut.

Diamond drill work upon the property of the Georgia Gulch M. Co., at Leadville, is in virgin territory. If the drill test is satisfactory the shaft will be sent down. J. V. Bohn is manager.

The Ohio M. Co.'s new shaft has been completed to 300 feet and drifts have been started. The ore has been found to increase in value with depth and the shaft is expected to develop pay ore.

The Ruby mine, on Iron hill, which has been shipping an average of from 800 to 1000 tons of lead sulphides per month, has had to curtail its product on account of the smelting companies refusing to receive that amount of ore. The Ruby produces ore running 17% to 18% lead, 30% iron and from 8 to 10 ounces in silver and a small amount of gold. The presence of lead in such quantities prevents the mine from finding a market with the pyritic smelter, so it is compelled to let the mineral stay in the mine.

OURAY COUNTY.

(Special Correspondence).—The smelting plant of the Home Pyritic Smelting Co. at Ouray is practically ready to blow in, and Supt. W. C. Laughlin says he will have a sufficient tonnage of copper and iron sulphides and oxides to keep the plant operating. It has one furnace of about seventy-five tons capacity, with Loder heating chamber and dust collector. The blower and crusher are operated by a Leffel water wheel of 250 H. P. The arrangement of ore bins for chuting different grades of ore to the charge floor is convenient and automatic.

The Yellow Jacket mine—five claims on Bear creek, near Ouray—belongs to C. E. Fryberger and G. Storm, who have driven a 500-foot tunnel to a strong body of ore 125 feet below the surface. Considerable of the ore sampled ran 30% Pb., to 30% zinc and twenty-five ounces to forty ounces silver to the ton. This mine is at an altitude of about 11,000 feet.

The American Gold M. Co. owns the American-Nettle mine, situate over 2000 feet above and overlooking the Uncompahgre stream, on which Ouray is located. A tramway 2100 feet long connects the mine with the mill in the valley. The underground work shows an upper and lower contact. The upper is extensively opened and has been a producer for years. At a point on the side of the mountain, 700 feet vertically below the upper workings, a tunnel will be driven 1000 feet on the horizontal ledge known as the lower contact. It is expected to recover ore bodies similar in size and character to those found on the upper contact.

The American-Nettle ores may be classed as first grade, consisting of oxidized iron and silicates carrying free gold; second grade, comprising sulphides of iron, lead and copper, having gold, silver and copper values. The smelting ore, shipped crude, runs ten ounces to fifteen ounces gold, and forty ounces to seventy ounces silver. This consists chiefly of the high-grade sulphides and oxides and amounts to forty or fifty tons per month. The mill, which handles about sixty tons

per day, is equipped with crusher, twenty stamps, amalgamating plates and four Wilfley tables. About 50% of the mill saving is on the plates and 50% in concentrates. Excepting where the material is oxidized, the ore is a hard quartzite gangue. In the chalcopryite ore the copper runs as high as 15%. The American Co. is made up largely of St. Louis, Mo., stockholders. The property is under the management of R. G. Hall, formerly with the Pueblo Smelting Co.

The Bachelor mine and mill ship 150 tons of crude ore and 150 tons of concentrates per month. The mill ores comprise a lead, zinc and iron sulphide, the concentrate products of which are all shipped together. This zinc concentrate is mixed with the lead product, because the former carries much of the silver. Supt. W. H. Bunc states that the concentrate shipped will run about 20% to 25% lead, 15% zinc and only about 3% iron. The gangue rock carries a high per cent of barium sulphate, or heavy spar, which goes with the concentrate as an insoluble residue.

The lower workings on the Bachelor are reached through a 500-foot shaft that sinks from the lower tunnel; levels Nos. 1, 2 and 3 from this shaft cut the vein at a distance of 150 feet. An upraise connects this work with the extensive workings on the higher levels. The Bachelor vein is opened up about 1300 feet longitudinally. The same vein is extensively opened on the adjoining Kehdive, Wedge and Nevada. G. R. Hurlburt is general manager of the Bachelor.

The Calope, belonging to C. H. Nix, is opened through a 600-foot tunnel, from the breast of which a shaft sinks 150 feet, and from the latter a crosscut runs 120 feet to the vein, on which there are over 500 feet of drifting. Pay ore in the vein ranges from 8 inches to 2 feet wide, the ores being a lead and iron sulphide, running well in gold, silver and lead. It is stated that some of it runs 1½ ounce to 2 ounces gold to the ton. Considerable stoping has been done and ore shipped from the drift below the tunnel level. The mill, which has ten stamps and concentrators, has been repaired and will soon be running again.

A short distance above the Calope is the El Mahdi, which belongs to Dennis Sullivan & Son of Denver and William Sullivan of Silverton. It is an old property which these parties took hold of two months ago. It comprises three claims, which are supposed to cover a portion of the Bachelor vein, which trends east and west. The old 100-foot shaft has been enlarged and retimbered and is being sunk 100 feet deeper, when a crosscut will be run to the vein. The ore is gold, silver and iron, in an iron and lead sulphide. Several years ago three carloads of ore from these workings were shipped that netted \$8000.

Ouray, Sept. 4.

PITKIN COUNTY.

(Special Correspondence).—The Hunter Creek M. Co., controlled by D. Brown of Aspen, is erecting a concentrating mill of 100 tons capacity near the entrance to the Cowenhoven tunnel at Aspen. The Della S. mine and others, which ship through the latter tunnel, are also controlled by Mr. Brown and associates. These mines, with the new mill, are in charge of Chas. Anderson as Supt. The ores produced are a silver-lead-zinc material, carried in a lime and heavy spar gangue. Some of the spar, or barytes, carries important silver values. Portions of the lime ore carry silver in chemical combination, in which case it is mined separately and not milled. It is stated that the crude ore will average about 6% lead and seven ounces silver. While most of the silver-lead ore here are in sulphide form, there are streaks of lead-zinc carbonates which are mined separately and not milled.

The new mill, which will be operating within a month, has a 20x6-inch crusher, two 30x14 rolls, two 6-foot Huntingtons, fourteen Wilfley tables, four Frue vanners—all to be operated by electric motors in the mill. The material, on leaving the rolls, is automatically sampled by a device of the mill owners. Most of the material is crushed and ground to sixty-mesh.

The Wilfleys here turn out, first, a coarse, heavy lead concentrate; second, a middling that passes through shaking launders to another set of Wilfleys; third, a quantity of barren tailings, comprising the lighter gangue; and fourth, the fine slimes that pass to hydraulic settlers and thence to the Frue vanners.

The entire concentrate product will pass to the drier, consisting of a steam heated chamber, 40 feet long, 30 inches wide and 1½ inch thick. This drier stands at an incline and the wet concentrates are slowly carried over it by scraping conveyors, by which the moisture will be reduced to 5%. The speed of all the tables will be governed by eighteen of the American expansion pulleys.

The San Jacinto mine, on the Castle creek side of Aspen mountain, has been

worked for years; but later developments are of interest. By driving a 350-foot tunnel high up toward the crest, ore was recently struck on the syncline contact. The same contact was also struck by a shaft driven at another point. Silver ore here in a lime-spar gangue ran \$100 per ton.

Aspen, Sept. 12.

SAN JUAN COUNTY.

(Special Correspondence).—The new Silver Lake mill is on the Animas, at the lower end of the 3-mile tramway from the Silver Lake mines. Since Manager S. I. Hallett took charge he has been making some changes in this mill, which will make it equal to about 400 tons daily capacity. There will be thirty-two Hallett tables, five Frue vanners, three Chili mills, four 14x27 and two 16x36 rolls; six twin jigs, with eight compartments to each twin. In place of the hydraulic classifiers he is putting in tandem shaking screens below each set of rolls and following the Chili mills. The five elevators have been reduced to two. The first one takes the entire mill product from the No. 1 rolls to automatic sampler and shaking screens; the second elevator takes the dry concentrates from the drier to the storage bins. Attached to the jigs are dewatering devices that take most of the water from the jig tailings before they pass to the rolls. The jigs will make three, five and eight-mesh products. The old spitzkasten, which is unusually long, is being replaced by three new ones in front of Chili mills, each to be five-compartment, 5 feet deep, 6 feet wide and 22 feet long.

The drier used consists of a steam chamber, 22 feet long, 30 inches thick, standing at an incline; and the concentrates are dried while passing over it to the boot of the second elevator.

The first operation of the mill is the passage of the ore over grizzlies to No. 1 crushing rolls, thence elevated to shaking screens of 3, 5, 8, 14 and 20 mesh respectively. The Nos. 3, 5 and 8-mesh product goes then to Nos. 1, 2 and 3 jigs, the fines going to Hallett tables. The tailings from Nos. 1, 2 and 3 jigs are carried to a set of 14x27 rolls, following which are shaking screens of 20, 40 and 100 mesh. The oversize of the 20-mesh and the middlings from tables go to Chili mills that grind to 30 mesh. The shaking screen following each Chili mill sizes to 50, 80 and 100 mesh. The 50 and 80-mesh products go to Hallett tables; the 100-mesh material goes to the spitzkastens, followed by vanner work.

In dewatering the fine concentrates as they pass to the drier the slimes go to settling tanks from which the water drains off. There is an automatic tailing sampler that does its work as the tailings pass from the mill.

Silver Lake ores carry about 70% silica and about 3% iron; the values being gold, silver, lead and copper. The lead is a galena. In concentrating there is a clean separation of the lead from the iron and copper, the last two going together. The gold is most of it in combination with the sulphides, though there is some in fine free particles in the quartz. The first-class product of the mill is a lead concentrate, with good gold values; the second grade is an iron and copper concentrate, carrying gold and silver.

The old mill, which is at the main tunnel level at the mine, has crushers, rolls, trommels, jigs and tables. The trommels size to 3, 4 and 10 mesh, the slimes therefrom passing to Wilfley tables. Two products are made from the twelve 4-compartment jigs, both of which are lead, carrying other values. The table concentrate goes as a copper product, with gold and silver. The jig tailings are recrushed by stamps, and go thence over trommels to the tables. The table tailings go to spitzkastens, are then dewatered and passed to eighteen belt concentrators, this final product joining the second grade. In the tailing pond at the old mill is a large tonnage of tailings. N. B. Wilcox, mechanical engineer, is superintending the work on the new mill and M. B. Pickel has charge of the old mill.

Silverton, Sept. 9.

SAN MIGUEL COUNTY.

(Special Correspondence).—The Bessie mill, which originally was specially equipped for cyanide work, is being remodelled and altered to make of it a straight concentrating mill. The changes are being made by Supt. E. Millard, who will soon have it running with crusher, four sets rolls, eight Bartlett tables and two Frue vanners. The Bessie mine and mill are now consolidated with the Alta and it is understood the latter will furnish the bulk of the ore. Both mines are in Alta basin. A new tramway is being built from the Alta to the upper terminal of the Bessie tram.

In the same basin, but on the opposite side, is the Gold King, whose tunnels connect with the Suffolk work on the Ophir

side of the range. Gold King ores are remarkably free-milling, as is evidenced by the mill work done on the property. The mill operates twenty stamps, driven by electric motors connected with the Telluride P. & T. Co. plant below Ophir loop. The thirty-eight tons of ore crushed per day passes over plates, there being no concentrators. Mill Supt. E. S. Platner states that the plate tailings do not run over 80 cents per ton. The values caught run from \$15 to \$25 per ton.

In Turkey Creek basin are two principal groups—the Four Metals and the Turkey Creek. Both properties are under the management of J. H. Shockley, though the ownership of the two is not the same. John Osborne has direct supervision of development in progress on the two properties. The Four Metals is being opened and worked through three tunnels that run southeasterly along the strike of the vein. The lower tunnel has been driven 350 feet, the upper 250 feet and the intermediate about 1000 feet. On the last there has been some stoping the full length of the tunnel. The vein, as shown by the above work, will average about 5 feet wide. The bulk of the ore is milling grade, though there is a streak of shipping ore along with it that will average 1½ feet wide. The ore comprises gold quartz, lead sulphides carrying gold and silver, with a good deal of antimonial silver and chlorides. Four carloads of the higher grades were shipped in the month of August. Ore bins and other improvements are being made.

The Turkey Creek Co. are driving a 1000-foot crosscut tunnel to cut several parallel veins at considerable depth below their old workings. The ore here is quite free-milling. A small stamp mill is on the property, which has run part of the time. Turkey Creek basin has two or three small lakes which furnish ample water supply for all purposes.

Sultana, Sept. 1.

TELLER COUNTY.

J. McElwee of Midway leased on the Hanna Britt, on the summit of Bull hill, Cripple Creek, with the engagement to run a drift 300 feet long. He sold all but one-tenth of his interest to others who then explored the 200-foot level with a candlestick and discovered an ore body from 2 to 6 feet in width that runs from \$40 to \$100 in gold to the ton. There is a long stope of it and ten to fifteen tons a day of ore are being broken out, while McElwee, with his tenth interest, stands off and feels as good as could any man under the circumstances.

Supt. Trevarthen of the Portland Co., at Victor, says the production for September, judging by the shipments already made, should run over 9000 tons, an increase of about 2000 tons over average for a considerable time. About 600 men are at work and the ore showing is improved, especially in the 1000-foot level. The shaft is below the 1100-foot point, and the drift to the north on the main vein has been run for a distance of 75 feet.

The Consolidated Mines Co. has ordered a new plant of machinery for the Wild Horse mine, at Cripple Creek. A production of eighty tons daily is being maintained, which could be doubled, were the hoist to permit. Two double-deck cranes and a 16x20 first motion, double-drum hoist are included in the new machinery.

IDAHO.

IDAHO COUNTY.

Col. Dewey, owner of thirteen of the claims on Thunder mountain, has organized a \$5,000,000 company in Pittsburg, with W. H. Dewey of Nampa president and general manager, W. E. Gibson vice-president, J. J. Walsh secretary and A. Q. Lewis treasurer. It is stated that more men would be employed at the property this winter than ever before and that the mill would be in operation in a few days.

LEMHI COUNTY.

The Kittle Burton mine has been sold to Michigan people for \$50,000. The new owners will erect works and commence operations on a large scale.

OWYHEE COUNTY.

From the DeLamar mine at Silver City the ore body found several weeks ago on the fourth level west has since been opened on the fifth, and prospecting work is now said to be under way on the eighth and other levels of the mine.

Installing the electric pumping plant at the Poorman mine at Silver City will be completed and the plant will be in operation in a month. In the meantime the gasoline hoist is keeping the water out of the shaft, the flow having decreased some.

MONTANA.

GRANITE COUNTY.

The Granite Mountain and Bimetallic Con. M. Co. is enlarging its concentrator from a daily capacity of 100 tons to 600 tons daily capacity. There are said to be

some large bodies of low-grade concentrating ore in the lower levels that can be treated at a profit. The stamp mill is in operation.

LEWIS AND CLARKE COUNTY.

The Superior & Montana Dev. Co. has been organized at Houghton, Mich.; capital \$50,000, paid in \$30,000. The incorporators are J. McNaughton, J. H. Lathrop, T. Hoatson Jr. of the Calumet & Hecla, J. R. Dee, J. H. Rice, R. M. Edwards, B. F. Chynoweth, L. Karger, M. Van Orden, R. H. Shields, J. Strubel, S. H. Brady, W. G. Rice of Houghton and G. Wallace of Marquette. J. R. Dee is president. The company holds an option on the Gold Belt mines near Marysville.

MADISON COUNTY.

G. D. B. Turner and C. Austin have taken a bond on the Pole Creek placer mines, owned by A. W. Tanner, who recently found a Ruby weighing over 500 carats. These mines pay well in gold besides the large number of garnets and rubies which are obtained as a bi-product. Outside capital has been taken in and it is proposed to work the mines on an extensive scale next year.

SILVER BOW COUNTY.

F. A. Heinze, who is now operating the Minnie Healey mine, is making improvements at the property. A new hoist has been put in with uprights 85 feet high, made of timbers 2 feet square and angle braces 110 feet long. A new Corliss engine has also been put in. About 100 men work in the mine and thirty-five on the surface, and 600 tons of ore are taken out daily.

NEVADA.

HUMBOLDT COUNTY.

The American Niter Co., which owns niter deposits 10 miles from Lovelock, is starting operations. Experiments have been made, and it is believed that a practical way of handling the crude material has been found. The principal products are sodium nitrate and a very fine quality of table salt. It is said that the niter belt extends for several miles along the Humboldt foothills.

J. A. Nelson's copper mines in Jackson Creek district, near Winnemucca, have been bought by Zellerbach, Hooker & Co. and D. Johnston. The price was \$40,000, upon which a payment has been made. It is stated that the new owners intend to erect a smelter and concentrator at the mines. There are already about 1000 tons of ore on the dumps.

LINCOLN COUNTY.

The Meadow Valley mine and many others at Pioche, bought recently by the Manhattan M. Co., have been started up, with E. F. Freudenthal as manager. The smelter and the railroad to Jackrabbit are being repaired.

H. M. Knight of Galveston, Tex., is examining the old Felix Knight mines, at Silver Park, with a view to reopening them.

LYON COUNTY.

The Miller Bros. have given an option to Capt. DeLamar for six months on the Douglass copper mine, near Delphi, at, it said, \$300,000.

A Mr. Pugh has bonded the Ludwig properties, near Yerrington, and is putting in a 35-ton smelter, expecting it to be in operation by Oct. 1. On the 200-foot level rich copper is being taken out.

The Cuyahoga G. M. & M. Co. is putting in a 25-ton cyanide plant in Mason valley. Ore running as high as \$60 a ton is being mined.

NYE COUNTY.

Returns from the smelter amounting to \$34,416.77 net, after deduction of railroad, freight and treatment charges, have been received by Tonopah leasers. The highest was on four tons of ore shipped by the Tonopah Co., which yielded \$705 per ton. The average value per ton on all returns received is about \$196 per ton. One lease received \$7918 and another lease \$6885. On the 11th inst. sixty-three tons of ore, value about \$10,000, were shipped from the camp. There are now on the road hauling ore and freight between Sodaville and Tonopah 310 animals.

WASHOE COUNTY.

(Special Correspondence).—Most of the copper prospects on Peavine mountain have lain idle since the closing down of the two smelters in Reno a year ago. The installation of a new smelter recently, and prospect of another soon, has started work on the mines again.

Redman & Holesworth will work soon on Anaconda No. 2, out of which last year they shipped two cars of high-grade copper ore.

A. B. Updike has a copper prospect and has done considerable on it.

The gold properties at Steamboat Springs are showing well, despite the difficulty of work arising from the ground heat from the boiling springs. At a depth

of 45 feet in onyx and quartz free gold ore has been struck assaying \$45 per ton.

The Senator M. Co., a new organization, has bought 120 acres adjoining the springs. Machinery is being installed and work will begin at once. The railroad runs across this property.

W. M. Billing, T. Degman, C. T. Zintz and F. Handrich have three claims near Steamboat Springs. Two of them run through the hot water formation, on which there is a good showing of ore exposed by open cut and shaft. The Copper Queen shows a 10-foot ledge between slate and basalt walls. There is a 25-foot open cut and a 40-foot tunnel, the ore increasing with depth. It carries \$12 in copper, besides silver and gold.

At Washoe the Monte Carlo mine is being worked for copper and gold. It is a large deposit. The owners are A. B. Updike and Mickell, Bready & Greiner.

The California-Nevada Copper M. & S. Co. have bonded from the Nevada Exploration Co. a mine on Peavine mountain, 20 miles north of Reno. The ore shows copper, gold and silver. Tunnels have recently located a vein of copper ore which shows up well.

Two claims owned by Norton & Bidwell, about 27 miles north of Reno and near Pyramid lake, have been bonded by C. A. Norcross of Washington, D. C., for an Eastern company. The property covers 3000 feet of gold and silver-bearing ledge, outcropping from 12 to 80 feet wide. The company has erected buildings, assay office, whim, track and ore cars have been put in. A shaft is down 70 feet, with crossdrifts from the bottom about 30 feet each way on the ledge. The vein is in an andesite fissure. Working tests of selected ores indicate an average value of about \$15 per ton. The company have recently taken up the bond and expect to continue development work through the winter, and in the spring erect reduction works.

The Copper Queen, 3 miles northwest of Reno, has a 12-foot wide ledge. The ore is a carbonate and runs 3% to 15% copper. The owners say they have 3000 tons of ore in sight. J. A. Pothoff, Norcross Bros. and D. W. Cutts are the owners.

Reno, Sept. 12.

NEW MEXICO.

GRANT COUNTY.

Representatives of the American Con. Copper Co. of New York are making an examination of its copper mines at Lordsburg to decide upon the erection of a plant and method of treatment which the company will install. The company has more than 10,000 tons of ore on its dumps and is opening up new ore bodies. The company is interested in the Burro mountain mining district, 27 miles northwest, but it is thought that Lordsburg will be selected as the point for the establishment of the plant. In the party are A. E. Gibson of Santa Fe, president of the company; W. Z. McDonald of New York, secretary; D. A. Walker of Columbus, Ohio, treasurer.

J. A. Hulit, of Silver City assay office, has been appointed superintendent of the development work on the claims of the Navajo Copper Co. at Burros, and is now working a few men sinking a shaft.

W. B. Hayden and R. Y. Anderson intend to resume work on the King at Organ. In a drift from the 100-foot level a 60-foot lode of iron carrying blue and gray copper and gold in quartz has been cut.

The Little Jessie and Copper Glance groups, in the Mogollon district, has been bought by C. M. Foraker, G. L. Rooks and W. S. Stickler of Albuquerque. The new owners will incorporate.

S. W. Winn of the Mineral Mountain M. Co. has bought a hoisting and pumping plant for the company's mines at Stein's Pass. Later the company expects to erect a concentrator.

RIO ARriba COUNTY.

The Silver Bar Copper Co., operating the Cooney mine, expects soon to pay its third dividend. The company has \$10,000 worth of ore at the mills. The main shaft is down 325 feet, the producing vein being 6 feet wide, averaging 15% copper for the entire width. The concentrates, which are made from about four tons of ore into one, average 52% for the entire production. Thirty men are employed. The property is practically in control of nine Colorado Springs mining men, headed by D. P. Sill.

TAOS COUNTY.

W. Fraser of Taos states that the new smelter will be built near Taos in the spring, the reduction works probably including a leaching plant.

OREGON.

JACKSON COUNTY.

The main shaft on the Ashland ledge, at Ashland, is now down 765 feet. Drifting on both sides of the shaft at the 700-foot level is being done. At this depth the

ledge averages about 7 feet in thickness, and is free-milling ore, with values much above the average. Stopping is being done from the 400-foot level down. The company contemplates putting in an air plant and introducing machine drills. At present steam is used to operate the mine, the machinery being located in a chamber on the 250-foot level, which is at the junction of the big east tunnel with the main shaft. Thirty men are employed. The company has a mill, provided with four concentrators, for which exceptionally good work is claimed. The Supt. reports that since the improvements in the mill were made the tailings average in value only 63 cents per ton.

UMATILLA COUNTY.

Z. Houser is building a smelter at the mines of the Standard Smelter Co., in the Dixie Butte country, south from Pendleton, in the Blue mountains. The smelter is of small capacity, but will do the work of the company for the present. J. J. Parker of Portland is in charge of the installation, with M. L. Hasbrouck doing the building.

UTAH.

BEAVER COUNTY.

The Klondike Copper M. Co. has been incorporated at Salt Lake City; capital \$200,000. The company is the owner of the Klondike, Klondike Extension, O. K. and Ben Harrison claims near Milford. J. S. Thompson is named as president, J. M. Hallaway treasurer and J. J. Treman secretary.

BOX ELDER COUNTY.

The Old Vag G. M. Co. has been incorporated in Salt Lake City; capital \$25,000. C. M. McEntire is president and J. L. Perkes secretary and treasurer. The company owns the Old Vag, Old Bum, Now Visible and El Oro Nos. 5 and 6, in Park valley.

GRAND COUNTY.

The Little Dab property, on Mineral mountain, at Basin, is producing rich bismuth silver ore. Davis Bros. and R. J. Thompson of Moab are leasing the mine. The value of the best ore now being taken out will run about 600 ounces silver, with some gold and copper.

JUAB COUNTY.

The Swansea M. Co., at Tintic, has let a contract to W. Hatfield, J. C. Sullivan and J. Nolan to sink the main shaft 200 feet from the 850-foot level. The company furnishes everything and hoist the waste and water, and pays \$16 per foot. Until the work is finished other operations underground have been discontinued.

SALT LAKE COUNTY.

The Southworth M. & M. Co. has been incorporated in Salt Lake City; capital \$30,000. It owns the Lucky Boy, Highland Boy Nos. 1 and 2 and Foote Nos. 1 and 2 claims in Farmington canyon. H. F. Southworth is president and J. E. Foote secretary and treasurer.

The Rocky Mountain S. & R. Co., with a plant at Florence, Colo., is said to be planning for a pyritic plant near Bingham and has secured a refusal of the Samson, the Yosemite and other claims now owned by the Western Exp. Co. at Bingham.

SUMMIT COUNTY.

The Wabash M. Co., capital \$200,000, has been incorporated; N. Treweek is president, H. S. Joseph secretary and W. Mont Ferry treasurer. The claims of the Wabash M. Co. consist of the Clara No. 2, Starmont, Helen Jessie, Wizard, Wizard No. 2, Frederick and Superior, about forty acres, near the Ontario at Park City.

TOOELE COUNTY.

The Sevier mine at Gold mountain has been sold by C. Lammersdorf, C. K. McCormick and A. E. Hyde to the Western Exploration Co., \$25,000 being paid down on account of \$125,000. W. F. Snyder, as president of the company, made the contract.

The Gracey M. & M. Co. has been incorporated at Waxahachie, Tex.; capital \$50,000, with J. F. Strickland, H. Kelland, J. A. Gracey, J. H. Miller, J. C. Smith, J. F. Wyatt and T. M. Sleeper directors. J. H. Schofield of Tooele county is appointed State agent in Utah.

The mill of the Sunshine M. Co. at Mercur is being remodeled by G. C. Moore of Salt Lake City, who is operating under an option. He is looking for latest devices in the leaching of low-grade gold ores. The more important of the new devices to be introduced is a successful slime treatment, the metal of which has been a dead loss. Discussing a new ore body recently uncovered on the 200-foot level, the management says that while some of it shows \$14 per ton in gold, the average rules at \$5.50, and can be made to pay dividends.

WASHINGTON COUNTY.

The Grand Gulch M. Co., operating a mine near St. George, is shipping ore that runs about 46% copper, without counting other values. So far nineteen cars have

an average of 45% copper. The cost of transportation is \$30 a ton from the mine to Salt Lake City. With 10,000 tons or more of the ore blocked out the company next spring expects to begin the erection of a smelter at the mine.

B. Jarvis, J. C. Keate and associates have incorporated the West Point Copper M. Co., to operate eight claims at St. George. The work of developing will be begun at once.

WASHINGTON.

YAKIMA COUNTY.

The Aurora Bar G. M. Co., R. T. Pettengill president, S. B. Herron secretary and general manager, with office in Spokane, will develop a deposit of placer gold near the village of Thorpe, in the bars of the Yakima river. The company have leases for 7 miles of the river banks, and tests have been made and the value of the ground proved. The bars are in the Yakima river just below the mouth of the Swauk creek, the Tanum and other streams that drain the east slope of the Cascade range, where many free-milling veins are found. Not only do the river bars contain gold, but there is gold in the dirt far back from the river. It is not flour gold, but coarse enough to be readily saved, together with black gold-bearing sand that can be sold at smelters. The plans of the company propose the installation of a dredger.

FOREIGN.

BRITISH COLUMBIA.

A smelter will be built at Marysville, B. C., to treat the silver-lead ore from the Sullivan group of mines. Work will begin at once and it is expected that the plant will be ready for operation by April 1 next. The company expects to mill and smelt its ores at a cost of not exceeding \$12 per ton. There are said to be 150,000 tons of ore on the dump and in sight. Among the interested parties are I. N. Peyton, E. Sanders, W. M. Ridpath and J. M. Armstrong of Spokane, Wash.

The tests recently made at the St. Eugene mill, at Moyle, on the second-class ore from the Keep Cool mine, show that without using either slime tables or vanners it is possible to make a five to one concentrate, giving 74% of the lead values and 80% of the silver values. The Keep Cool Co. is planning to send three tons of typical ore to Denver for metallurgical tests, to determine what process of concentration is most suitable. The company is planning to put up a mill.

A proposal has been made by A. Geiser of Baker City, Or., to take a contract to work the Le Roi mines at Roseland, B. C. Mr. Geiser has paid a visit to the mines and has been furnished by B. MacDonald, the manager, with a list of the prices paid for labor in the mines before making a definite offer of terms. He will offer to take a contract to deliver lime at the smelter at Northport.

Work has been started on the Britannia mines at Howe Sound recently bought by a Butte syndicate. F. M. Leonard, manager of the company, states that Mr. Heinze has no interest in the property.

G. W. Averill of Roseland has bonded the Banner claim, Summit camp, to a Dr. Hindly of Minneapolis, Minn. A shaft 85 feet deep is in ore, which averages \$20 in copper and gold values. A company is to be organized at Minneapolis to develop the property.

MEXICO.

In the Ures district of Sonora, near Hermosillo, are the mines of the Gabilan M. Co., J. L. Green manager, upon which development work is being done. The mine known as the Gabilan includes the La Luz, El Porvenir and San Jose claims, through which there runs a ledge 4 feet in width. A foot of this ledge yields silver ores running from 1000 to 8000 ounces per ton, and the remainder yields ores which pay well. These claims were worked by former owners many years ago, and the old workings followed the ledge upon inclines. Now a vertical, double-compartment shaft is being sunk which will cut the vein at a depth of several hundred feet.

J. D. Fresh and J. Penman have interested Eastern capital in their copper properties, 35 miles west from Hermosillo, and a company has been organized to develop and exploit them. The incorporators are J. C. Campbell of St. Louis and J. W. Simpson of Brunswick, Mo. Development work is now being done with J. D. Fresh as manager.

NEW SOUTH WALES.

The output of the Broken Hill Proprietary Co. for the year ending May 31, 1901, is reported as follows: Silver, 3,009,164 fine ounces, against 2,780,937 ounces for the previous half year, the price realized being 3½d per ounce less; lead, 27,869 tons, against 21,855 tons, returning an average of \$3 11s 6d per ton less than was obtained for the previous period.

Personal.

H. P. LEWIS of New York is at Phoenix, Ariz.

J. D. SCHUYLER, C. E., of Los Angeles, Cal., is in San Francisco.

J. V. HARMON of Butte, Mont., is visiting Salt Lake City, Utah.

F. F. FRIANT has been appointed Supt. Castle Dome mine, near Yuma, Ariz.

C. E. LOOSE of Joseph, Utah, has returned to that place from Houghton, Mich.

R. NICHOLS, lately in Koolgardie, West Australia, is now at Salt Lake City, Utah.

C. AMSDEN has returned from a six months' trip to South America, to Bisbee, Arizona.

M. J. O'MEARA of Tonopah, Nev., is sojourning in Salt Lake City, Utah, for a few days.

E. JONES has been appointed superintendent of the Sacramento mine at Mercur, Utah.

J. V. FLEMING has resigned as superintendent of the Silver King mill at Park City, Utah.

C. I. RADER has been appointed superintendent of the Annie Laurie mine, Kimberly, Utah.

FRANK HALL has resigned as general manager of the Sweepstake M. Co., operating at Weaverville, Cal.

O. P. POSEY, general manager Bingham Con. M. Co., at Bingham, Utah, is sojourning at his home in Los Angeles, Cal.

W. C. RALSTON, manager of the Melones mine, at Angels Camp, Cal., has returned there from a visit to New Mexico.

J. P. TURNER of Salt Lake City, Utah, has been appointed consulting engineer of the Bonanza M. Co. at Park City, Utah.

J. D. HAGUE, manager of the North Star M. Co., was in Grass Valley, Cal., this week inspecting the mines of the company.

J. A. KIRBY, Supt. Daly-West mine, at Park City, Utah, has returned there from Ploche, Nev., where he has been examining mines.

J. A. ANDERSON, manager of the Tonopah M. Co., of Tonopah, Nev., has returned to the mine from a visit to Philadelphia, Pa.

G. L. KEENER, manager of the Mary McKinney mine, at Cripple Creek, Colo., has also taken charge of the Eclipse mine at the same place, the two properties having been consolidated.

Recently Declared Mining Dividends.

| | Payable. |
|----------------------------------------------------------------------------------------------|----------|
| Ontario Silver M. Co., Utah, 10 cents per share..... | Oct. 1 |
| Gwin Mine Dev. Co., California, No. 25, 5 cents per share, \$5000..... | Sept. 20 |
| Adams G. M. Co., Colorado, 5 cents per share, \$7,500..... | Oct. 1 |
| Santa Maria, Mexico, \$4 60 per share, \$11,500..... | Sept. 10 |
| Standard Con. M. Co., Idaho, monthly, 5 cents per share, \$25,000..... | Sept. 22 |
| Homestake G. M. Co., South Dakota, monthly and extra 25 cents per share each, \$105,000..... | Sept. 25 |
| Gold Coin M. Co., Colorado, monthly, 3 cents per share, \$30,000..... | Sept. 25 |
| Con. Colorado M. Co., Colorado, monthly, 1 cent per share, \$19,000..... | Sept. 25 |

Commercial Paragraphs.

CRANE CO. has this summer erected at its works at Jefferson, Van Buren and Desplaines streets, Chicago, a foundry which is to be devoted exclusively to very heavy work, i. e., flanged fittings and large valves. It is equipped with two cupolas, an electric traveling crane, and every other modern convenience. This new foundry will increase Crane Co.'s capacity for very heavy work about 50%; it will be in operation Nov. 1st.

THE recent robbing of the vault of the Selby Smelting Co., at Crockett, Cal., points out the fact that it is necessary to have every protection possible to prevent the removal of valuable material by thieves. Vaults which are isolated can be easily equipped with a microphone attachment, and a watchman listening at stated intervals should be able to detect any unnatural noises. As an extra precaution, the act of listening could be recorded on a dial which would show the exact time the watchman performed this duty. In most places, a sound like the grating of a drill, while not audible to the ear, would be picked up by the microphone and transmitted to the receiver, even being intensified by the induction coil. The Ericsson transmitter is admirably adapted for the

purpose on account of its extreme sensitiveness and immunity from packing. Many transmitters will work when used frequently, as this serves to agitate the carbon granules, but very few will work after having stood a long time in absolute stillness without first being shaken slightly. This fact leaves the Ericsson in a field by itself for this class of work, and combined with the receiver and other apparatus of equal merit, makes an equipment that can be thoroughly relied on in every instance. Further information concerning this apparatus or anything else in the telephone line can be obtained by writing to the office of the Ericsson Telephone Co., 296 Broadway, New York City, or to their Pacific Coast agents, the Electric, Railway & Manufacturers' Supply Co., 68-72 First St., San Francisco, Cal.

New Patents.

DEWEY, STRONG & CO.'S SCIENTIFIC PRESS PATENT AGENCY, 330 Market St., S. F., has official reports of the following U. S. patents issued to Pacific coast inventors:

FOR THE WEEK ENDING SEPT. 10, 1901.

682,378.—WATER ELEVATOR.—J. E. Armstrong, Santa Cruz, Cal.
 682,383.—PUMP.—D. Bashore, Walla Walla, Wash.
 682,382.—METALLIC OXIDES.—C. A. Beck, Good Springs, Nev.
 682,452.—RULER.—A. H. Bubher, S. F.
 682,528.—ORE SAMPLER.—A. C. Calkins, Los Angeles, Cal.
 682,530.—BLOWPIPE.—A. C. Calkins, Los Angeles, Cal.
 682,317.—DENTAL ENGINE.—M. N. Callender, S. F.
 682,176.—CAR VENTILATION.—W. T. Cottler, Portland Or.
 682,179.—HASP LOCK.—I. C. Drake, Orling, Wash.
 682,181.—WELL CASING.—Eastwood & Hoagland, S. F.
 682,325.—FOOT REST.—J. C. Garrett, S. F.
 682,463.—FIRE POT.—J. W. Gheen, Portland, Or.
 682,351.—TREADLE.—T. T. Gordon, Juniper, Or.
 682,382.—LIQUID BALANCE.—J. W. Gray, Oakland, Cal.
 682,500.—LAWN SPRINKLER.—T. J. Greer, St. Helena, Cal.
 682,353.—CAR COUPLING.—G. C. Harlin, Stockton, Cal.
 682,562.—FURNACES.—A. Heberer, Berkeley, Cal.
 682,478.—RODDER.—J. Maroff, Tillamook, Or.
 682,478.—DUST EXCLUDER.—J. P. Martin, Ely, Nev.
 682,384.—WRONCH.—J. D. McFarland Jr., S. F.
 682,385.—EXPLOSIVE ENGINE.—J. D. McFarland Jr., S. F.
 682,403.—LEDGER.—A. E. Partridge, Seattle, Wash.
 682,493.—CARRYING CASE.—R. E. Pendleton, Red Bluff, Cal.
 682,578.—VENDING MACHINE.—B. W. Scott, San Jose, Cal.
 682,504.—MUSICAL INSTRUMENT.—E. Strieker, Bisbee, Ariz.
 682,563.—PLOW.—A. B. Strong, Perrydale, Or.
 682,411.—MIXING MACHINE.—W. Sukale, Santa Rosa, Cal.
 682,371.—CONCENTRATOR.—H. P. Taylor, Hailey, Idaho.
 682,577.—HOSE COUPLING.—C. A. Tripp, Los Angeles, Cal.
 682,378.—HANK.—W. Wood, Santa, Cal.
 35,056.—DESIGN.—Tuckey & Kline, S. F.

Notices of Recent Patents.

Among the patents recently obtained through Dewey, Strong & Co.'s SCIENTIFIC PRESS U. S. and Foreign Patent Agency, the following are worthy of special mention:

AUTOMATIC WATER ELEVATORS.—No. 682,378. Sept. 10, 1901. J. E. Armstrong, Santa Cruz, Cal. The object of this invention is to provide a mechanism by which a small flow of water having a sufficient elevation may be collected into a receiving tank and thence delivered into an endless chain of peculiarly constructed buckets, which chain passing over a drum at the upper end acts to drive a pump which takes its supply from the same receiver and lifts a portion of the water arriving from the same source of supply to an elevation above the receiver and the source.

ENGINE.—No. 682,359. Sept. 10, 1901. W. C. Riley, Lake City, Colo. This invention relates to improvements in engines such as are operated by steam or other propelling medium. It has for its object the furnishing of a compact machine in which a single lever controls the starting, stopping, reversing, or running of the engine at any speed and without the aid of the usual eccentrics or links. It consists of an engine having its cylinders radially disposed in relation to a main power shaft, oscillating inlet valves at the outer ends of these cylinders and a governing device by which said oscillation is effected. There is a controlling valve related to each of said inlet valves, and a means by which said controlling valves are operated in unison.

WRENCHES.—No. 682,384. Sept. 10, 1901. J. D. McFarland Jr., San Francisco, Cal. one-half assigned to John Bruckman of same place. This invention is designed to furnish a device that can be operated in a very limited space and whereby it is not necessary to engage the object to be turned with every rotation of the handle. The device includes a handle having a head provided with a circular opening, a circular jaw mounted in said opening and provided with gear teeth on one of its faces, a shaft parallel with the handle and provided with a bevel gear for engaging the teeth of the jaw, and means for rotating the shaft and continuously operating the jaw without movement of the handle.

ROTARY EXPLOSIVE ENGINES.—No. 682,325. Sept. 10, 1901. J. D. McFarland Jr., San Francisco, Cal., one-half assigned to John Bruckman of same place. This invention is especially designed to allow the use of an explosive gas or vapor in the propulsion of a rotary engine. It comprises a plurality of cylinders having the outer ends connected with the interior of a wheel rim, and the piston rods from the inner ends connecting with a stationary crank or point of support which is out of the center of the wheel, so that impulse delivered through the cylinders and pistons will act to rotate the wheel.

Latest Market Reports.

SAN FRANCISCO, Sept. 18, 1901.

SILVER.—Per oz., Troy: London, 27d (standard ounce, 925 fine); New York, bar silver, 58½c (1000 fine); San Francisco, 58½c; Mexican dollars, 47½c San Francisco, 45½c New York.

COPPER.—New York: Lake, 1 to 3 casks, \$17.25; carload lots, \$17.00; Electrolytic, 1 to 3 casks, \$16.75; carload lots, \$16.62½; Casting, 1 to 3 casks, \$16.60; carload lots, 16.50. San Francisco: 18. Mill copper plates, 20c; bars, 22½c. London: £67 13s 9d per ton.

LEAD.—New York, \$4.37½; Salt Lake City, \$4.00; St. Louis, \$4.40; San Francisco \$4.90, carload lots, 5½c 1000 to 4000 lbs.; pipe 6, sheet 6½, bar 5½c; pig, \$5.25. London, £12 per ton=2.59 cents per lb.

SPELTER.—New York, \$4.20; St. Louis, \$3.75; London, £16 2s 6d per ton =3.58½ cts. per lb.; San Francisco, ton lots, 5½c; 100-lb lots, 6c.

ANTIMONY.—New York, Cookson's, 10c; Hallett's, 9c; San Francisco, 1000-lb. lots, 10c; 300 to 500 lbs., 11c; 100-lb. lots, 13½c.

IRON.—Pittsburg, Bessemer pig, \$16.00; gray forge, \$14.00; San Francisco, bar, per lb., 2.65c in small quantities.

STEEL.—Bessemer billets, Pittsburg, \$24; open hearth billets, \$26.50; San Francisco, bar, 7c to 12c per lb.

TIN.—New York, pig, \$27.50; San Francisco, ton lots, 30c; 1000 lbs., 30½c; 500 lbs., 30½c; less 31c; bar tin, 3½c.

QUICKSILVER.—New York, \$51.00 large lots; London, £9 2s 6d; San Francisco, local, \$47.50 ½ flask of 76½ lbs.; Export, \$45.00.

MAGNESIUM.—New York, \$2.90 ½ lb.; San Francisco, \$3.75.

ZINC.—San Francisco, 5½c; slab, 5½c; bar, 7c; zinc dust, N. Y., 8c.

BABBITT METAL.—San Francisco, No. 1, 10c.

NICKEL.—New York, 50¢@60¢ ½ lb.

ALUMINUM.—New York, No. 1, 99% pure ingots, 35c; No. 2, 90%, 30c to 35c.

SOLDER.—Half-and-half, 100-lb. lots, 19c; San Francisco, Plumbers', 100-lb. lots, 15½c.

PHOSPHORUS.—F. o. b. New York 50¢@60¢ ½ lb.

ASSAY LITHARGE.—San Francisco, 10c ½ lb. small lots.

PLATINUM.—San Francisco, crude, \$19 ½ oz.; New York, \$20.50 per Troy oz.

BISMUTH.—New York, ½ lb., \$2.25 50-lb lots; San Francisco, \$2.50 to \$2.75 ½ lb. lots.

FERRO-MANGANESE.—Pittsburg, 80%, domestic, \$58.50, large lots.

TUNGSTEN.—New York, ½ lb., 95c; San Francisco, \$1.15.

FERRO-TUNGSTEN.—New York, 37%, 32c; San Francisco, 65c (60%).

POWDER.—F. o. b. San Francisco: No. 1. 70% nitro-glycerine, per lb., in carload lots, 15½c; less than one ton, 17½c. No. 1*, 60%, carload lots, 13½c; less than one ton, 15½c. No. 1** 50%, carload lots, 11½c; less than one ton, 13½c. No. 2, 40%, carload lots, 10c; less than one ton, 12c. No. 2* 35%, carload lots, 9½c; less than one ton, 11½c. No. 2** 30% carload lots, 9c; less than one ton, 11c. Black blasting powder in carload lots, minimum car 728 kegs, \$1.50 per keg; less car lots, \$2 per keg.

CAPS.—3x, \$5.50 per 1000; 4x, \$6.50; 5x, \$8; Lion, \$9, in lots not less than 1000.

FUSE.—Triple tape, \$3.60 per 1000 feet; double tape, \$3.00; single tape, \$2.65; Hemp, \$2.10; Cement No. 2, \$3.00; Cement No. 1, \$2.65, in lots of 3000 feet and up.

CANDLES.—Granite 6s, 16 oz., 40s., 9½c ½ set; 14 oz., 40s., 8½c.

OILS.—Linseed, pure, boiled, bbl., 75c; cs., 80c; raw, bbl., 73c; cs., 78c. Deodorized Stove Gasoline, bulk, 14½c; do., cs., 20½c; 88° Gasoline, bulk, 20c; do., cs., 26c; 63° Naphtha or Benzine, deodorized, in bulk, per gal., 13½c; do., in cs., 19½c; Lard Oil, Extra Winter Strained, bbl., 75c; cs., 80c; No. 1 bbl., 50c; cs., 55c. Neatsfoot Oil, coopers' bbls., 60c; cs., 65c; No. 1 bbl., 50¢@52½c; cs., 55¢@57½c.

CHEMICALS.—Cyanide of potassium, 98%—99%, jobbing, 31½¢@32½¢ ½ lb.; carloads, 29¢@30c; in 10-lb. tins, 40c; sulphuric acid, in carboys, 66¢ B. 2c ½ lb.; soda ash, \$1.90 ½ lb. 100 lbs.; hyposulphite of soda, 21¢@30c ½ lb.; blue vitriol, 5½¢@6½¢ ½ lb.; borax, concentrated, 7¢@8c ½ lb.; chloride of potash, 12¢@13c; roll sulphur, 6c; alum, \$1.90¢@2.00; flour sulphur, French, 2½¢@2½c; California refined, 1½¢@2c; nitric acid, in carboys, 8c ½ lb.; caustic soda, in drums, 3¢@4c ½ lb.; Cal. s. soda, bbls., \$1.00; sks, 95c ½ lb. 100 lbs.; chloride of lime, spot, \$2.50¢@2.60; nitrate of potash, in kegs, 8c; caustic potash, 10c in 40-lb. tins.

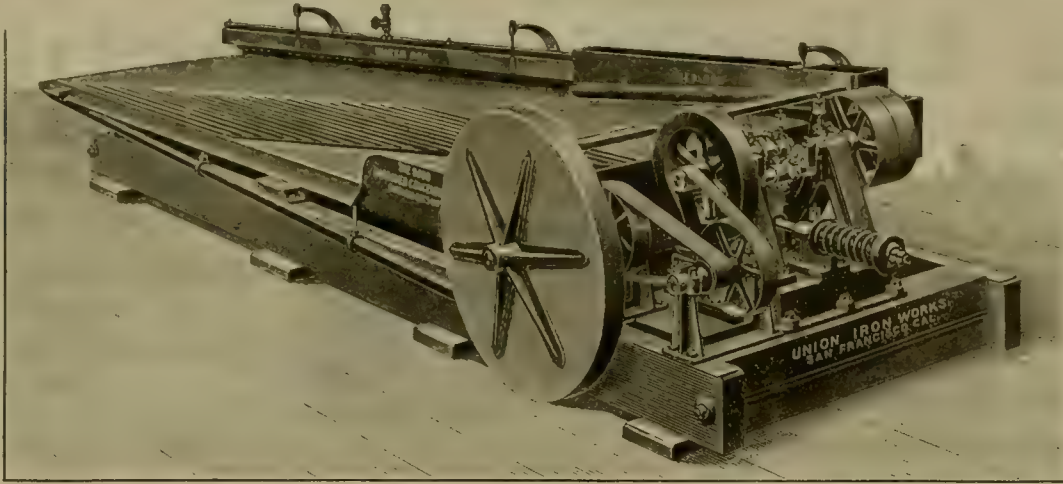
COAL.—San Francisco, coast, yard prices: Wellington, \$9; Seattle, \$7.00; Coos Bay, \$5.50; Southfield, \$9.00. Cargo lots, Eastern and foreign: Wallsend, \$8.00; Brymbo, \$7.50; Pennsylvania, hd., \$14.00; Scotch, \$8; Cumberland, \$12; Cannel, \$9.50; Welsh Anthracite, \$12.00; Rock Springs, \$8.50; Colorado Anthracite, \$14.50. Coke, \$16 per ton in bulk; \$18 in sacks.

(—) Indicates every other week or monthly advertisements.

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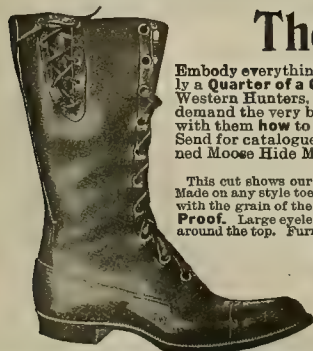
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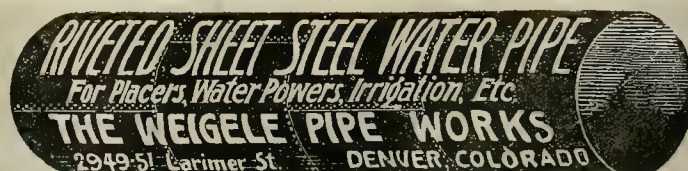
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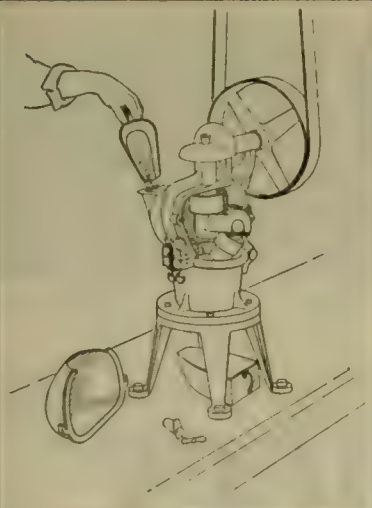
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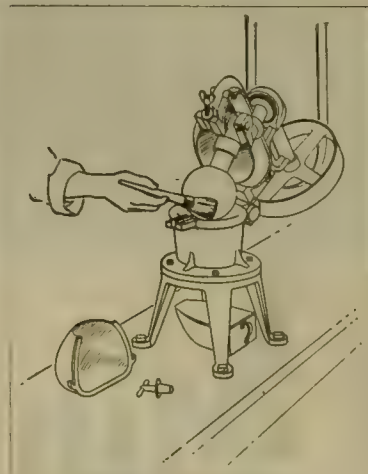
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CLEANING.

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The rotary and gyratory motion of the ball quickly reduces the hardest rock to a hundred or finer powder.

Adjustable to different hardness of rocks.

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Mortar and ball turned true by special tools.

Parts wear to place.

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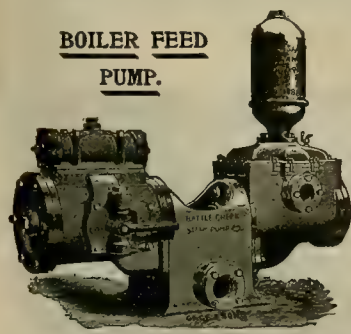
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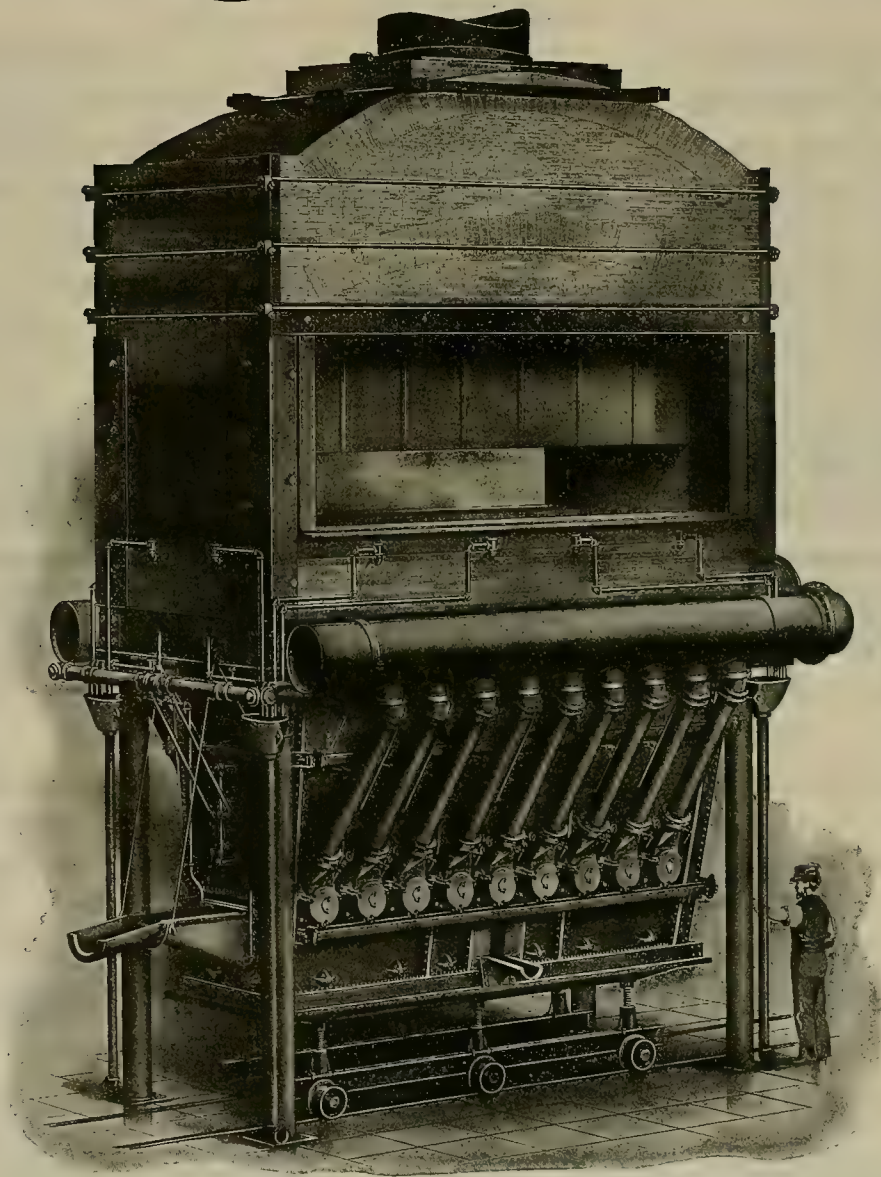
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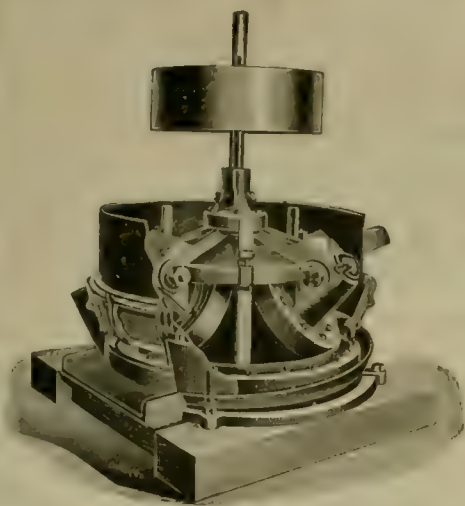
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# ORE MILL.

The Griffin Three Roller Ore Mill is a simply constructed Mill, suitable for working all kinds of ores that require uniformly fine crushing by the wet process. This Mill is a modification of the well-known Chilian Mill, but the rollers run upon a crushing ring or die, which is inclined inwardly at an angle of about 30 degrees, the rollers themselves also being inclined to the central shaft of the Mill, thus utilizing the centrifugal force, as well as the weight of the rollers themselves as a crushing agent. The Griffin Three Roller Ore Mill is therefore a Mill of great strength, and has few wearing parts. We construct these Mills with extreme care, using only the best of raw materials, which are most carefully worked by men who are specialists as mill builders. We sell the Griffin Ore Mill on its determined merits, and will gladly supply full information regarding it to any one.

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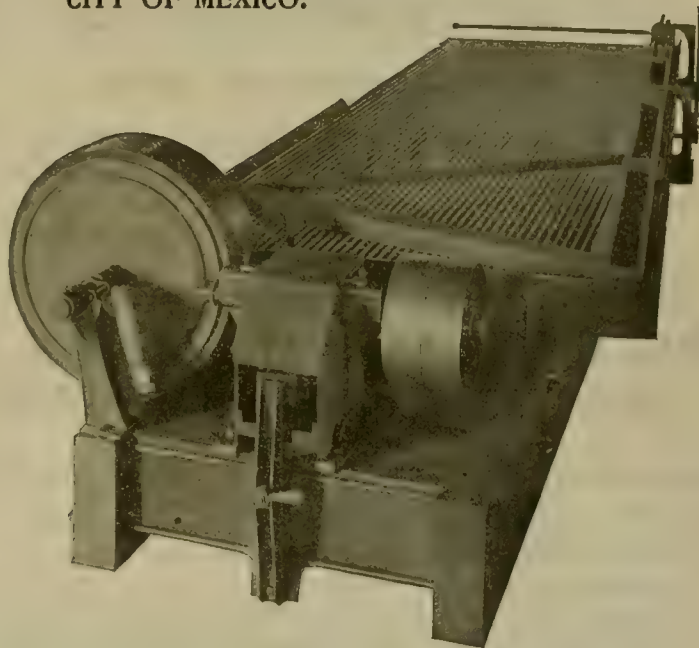
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It will give better net returns than any other machine.  
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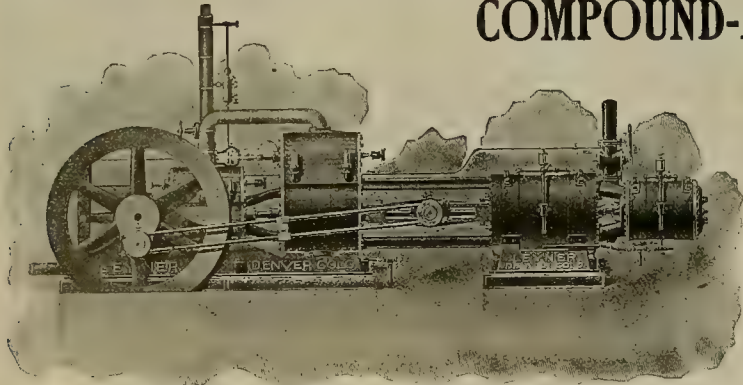
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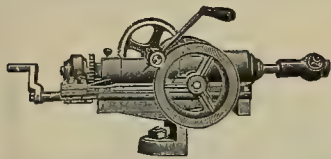
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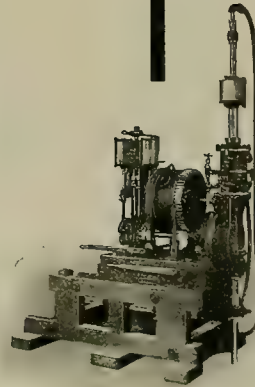
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A "New Badger" Drill gets the maximum efficiency from each pound of steam. This saves money. Our catalogue gives proof.



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For Prospecting Mineral  
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Machines for any depths,  
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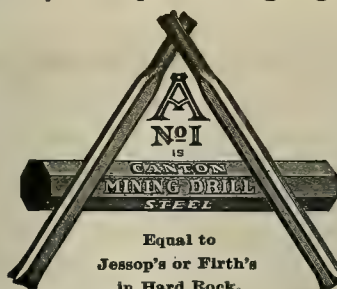
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Practical  
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Stands  
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# THE GARDNER ELECTRIC ROCK DRILL.



GREAT  
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OF  
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OF THE SINGLE LIFT, CONTINUOUS BUCKET TYPE WITH

Working Capacity from 1500 to 5000  
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AS DESIGNED AND MANUFACTURED BY

THE BUCYRUS COMPANY, South Milwaukee, Wis.  
IMPROVED GOLD SAVING DEVICE  
of highest efficiency.

DREDGES CONSTRUCTED COMPLETE UNDER  
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Has no equal in Hard Rock Drilling.

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Sold by Seattle Hardware Co., Seattle, Wash.

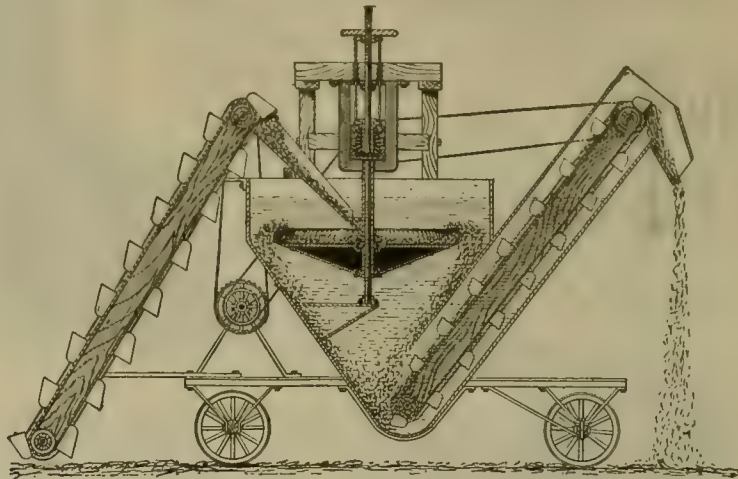
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PATENTED AUGUST 27, 1900.

The "Wonder" Placer Mining Machine. The machine for which the mining world has been waiting. The only Practical and Perfect Placer Machine in existence. LACK OF WATER IS NO LONGER AN OBSTACLE TO PLACER MINING. A 1-inch stream will furnish ample water for a 50-ton per hour machine.

CAPACITY FROM 2 TONS TO 200 TONS PER HOUR.



The above cut gives a sectional view of the "Wonder" Placer Machine as it appears in operation.

The machine is mounted in a Portable Steel Tank, which is equipped with conveyors for feeding the ground into the machine and for removing the tailings. The tailings conveyor is equipped with our patent, endless, perforated steel buckets, which are designed to keep the tank perfectly clear of tailings all the time.

## CAPACITY.

The capacity of the "Wonder" Placer Machine is its most surprising feature. No other placer machine ever invented can approach it either as a gold saver or in handling the ground.

The actual capacity of our machines is, under favorable conditions, from  $\frac{1}{4}$  to  $\frac{1}{2}$  greater than advertised.

For handling the Tailings from Stamp Mills, or for separating the free gold from the ores pulverized by either wet or dry process, the "Wonder" Machine is without an equal.

Every practical mine operator and expert who has seen our "Wonder" machine in operation concedes that it is the greatest machine in existence.

## WHAT OTHER PEOPLE SAY.

Report from "Wonder" Concentrator being operated by Cyclone Drill Company in connection with their prospecting drill at The Mining Congress:

BOISE, IDAHO, July 24th, 1901.

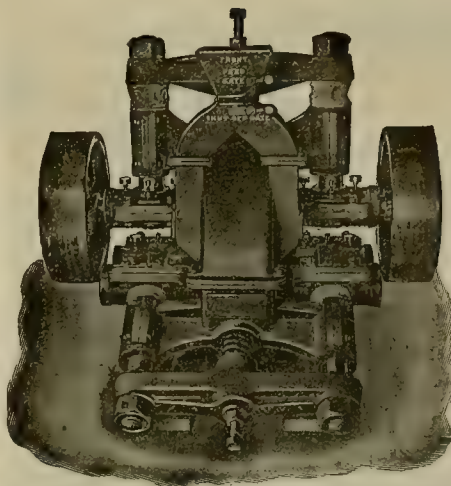
GENTLEMEN:—We have the drill shipped July 1st set up and in operation on High School lot in heart of city and are attracting more attention than any other one exhibit. I came here from the South Boise ground where we have the first drill and pan sent out in operation. The drilling is very hard, but the machine is doing good work, and the pan perfect work. It saves everything. All the panning I have done after it, I have failed to find a color where the pan has been properly operated. The combination being new and the discharge from the drill very strong, some gold went over in the first two holes, but it was not fault of pan. From the holes put down after I got on the ground, the tailings do not show a color, and I panned them thoroughly.

Yours very truly,

C. W. PURSELL.

For Descriptive Catalogue, terms, etc., write to

THE INTERNATIONAL MINING AND DEVELOPING CO.,  
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# KENT DRY PULVERIZER.

Reduces the hardest ores, and makes best product for any treatment. Combines best wearing qualities, economy of power and great capacity. Runs 24 hours every day without stoppage for oiling, adjustment or repairs. Shipped as shown, ready to run.

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Wm. Jessop & Sons, Ltd.  
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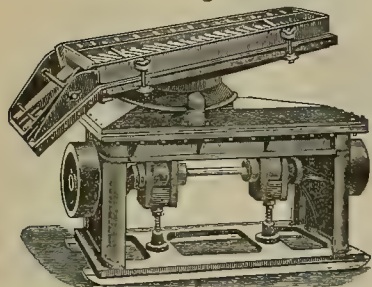


**TREAT YOUR ORES,  
SAVE YOUR VALUES,**

**CONCENTRATE  
AND ...  
AMALGAMATE**

In substance at one operation  
by the

**Hooper**   
**Pneumatic**  
 **System.**



Floor Space, 3x6 Ft. Weight, 2250 Lbs.  
Capacity, 10 to 50 Tons Daily.

WE USE NEITHER  
WATER, CHEMICALS NOR QUICKSILVER.

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| Gold,   | Copper,     | Corundum,     |
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| Mica,   | Clays,      | Black Sands,  |
| Tin,    | Garnet,     | Any Sands,    |
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"It's the best GOLD saver in the world."

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"Saves the minutest float Gold, and after two years' use am convinced it is the only machine that will save float Gold."

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Is the only reliable method of treating mixed, slimy or rebellious ores. Zinc and lead combinations handled in good shape where all other processes had failed.

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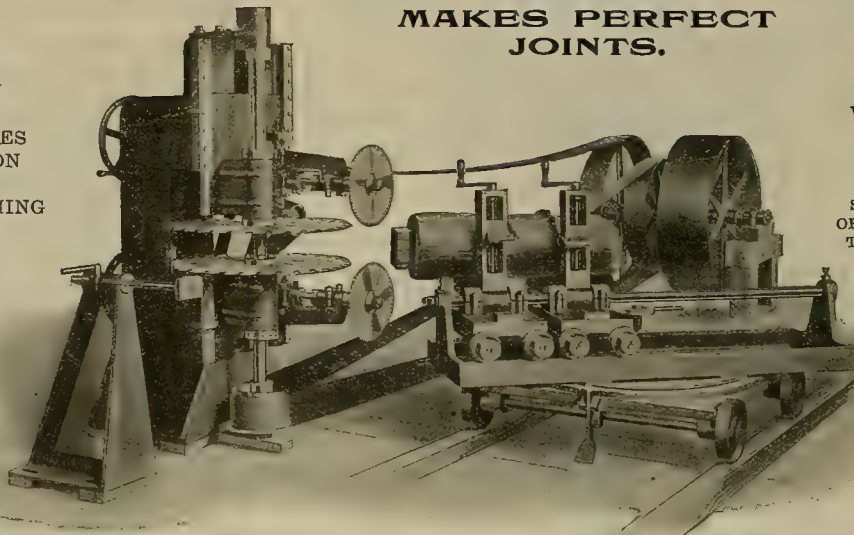
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MACHINE.



**MAKES PERFECT  
JOINTS.**

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**HOISTING DERRICKS**==Operated by  
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**HYDRAULIC GIANTS**==Double Jointed  
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Mining Cars,  
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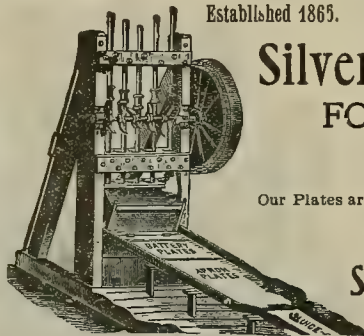
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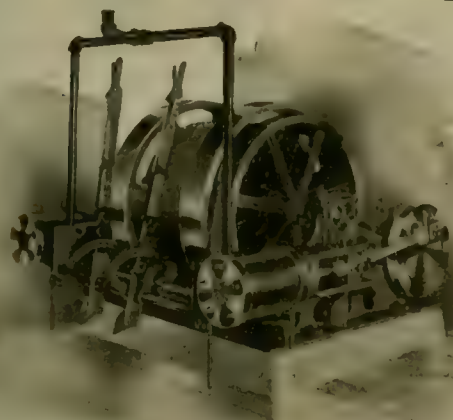
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ALL POINTS EAST.  
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DOUBLE CYLINDER, DOUBLE FLAT  
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The Most Complete Line of Patterns Owned by  
Any Concern in the United States,  
Consisting of

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First and Second Motion,  
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FOR

## STEAM, ELECTRICITY, COMPRESSED AIR or GASOLINE.

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## THE BARTLETT CONCENTRATOR. THE LATEST AND BEST CONCENTRATING TABLE.



A Few of Its  
Advantages:

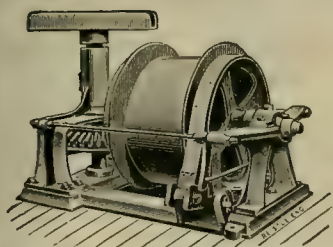
Wearing parts reduced to a minimum. All parts are interchangeable.  
Will take ore from finest mesh up to 6-mesh without sizing.  
A complete substitute for jigs, buddles, slime tables, belt tables, and all systems  
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ESPECIALLY DESIGNED FOR SEPARATING ZINC FROM LEAD.  
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The automatic brake is positive and powerful yet sensitive.  
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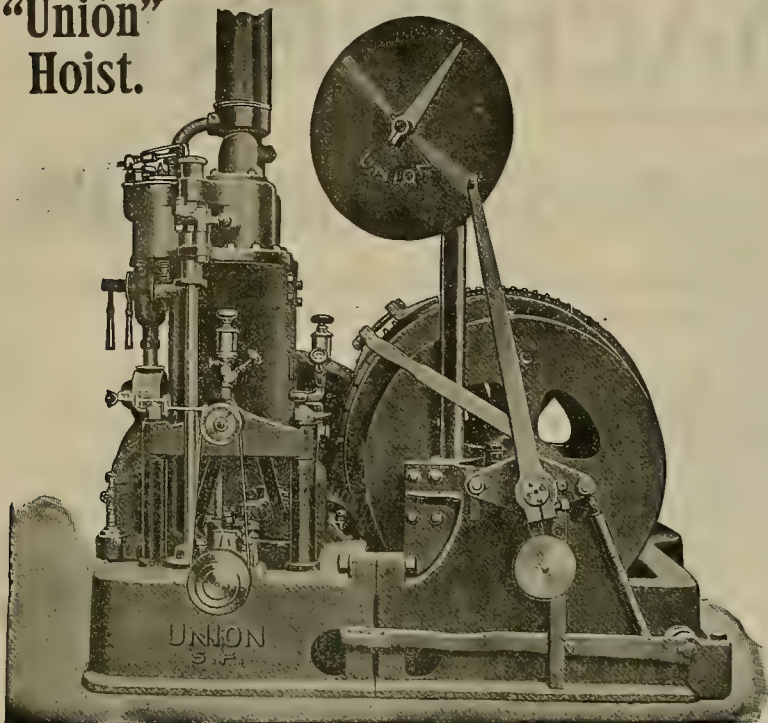
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STATIONARY ENGINES for All Kinds of Work in Sizes from 5 to 300 h. p. in actual use

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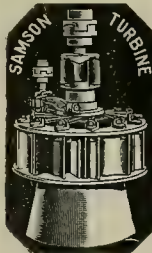
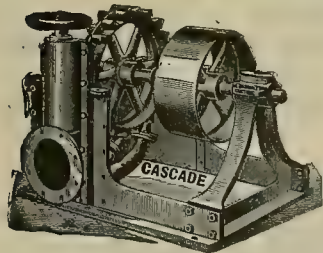
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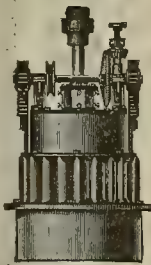
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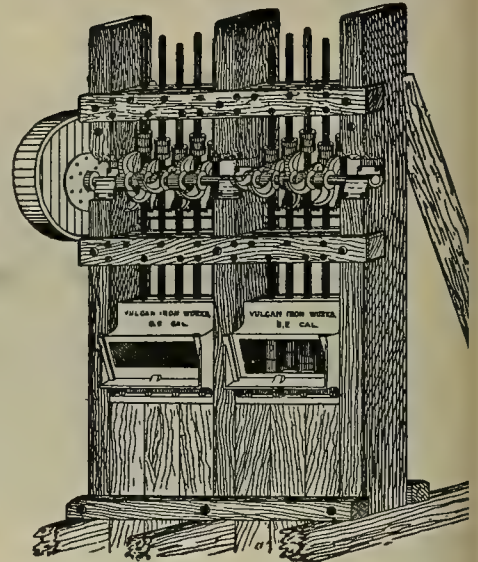
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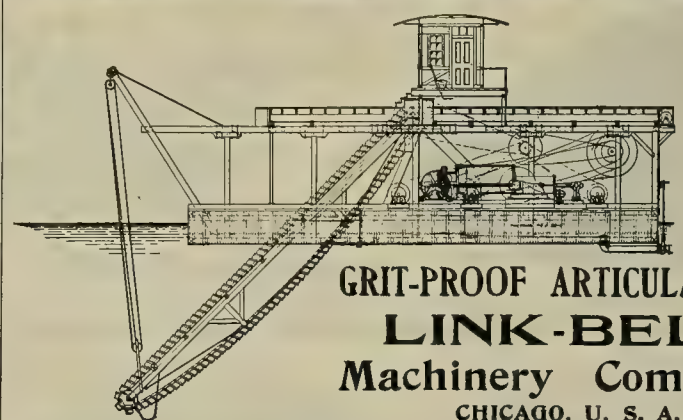
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**THE CALIFORNIA DEBRIS COMMISSION,** having received applications to mine by the hydraulic process from A. E. Jones, in the Hamilton Placer Mine, near Johnsonville, Plumas Co., to deposit tailings in Nelson Creek; from Ellen C. Sargeant et als, in the Quaker Hill No. 2 Mine, at Quaker Hill, near Nevada City, Nevada Co., to deposit tailings on a flat below the mine; and from the Calaveras Mining, Water and Power Co., in the Round Butte Placer Mine, near Sheep Ranch, Calaveras Co., to deposit tailings in O'Neill Creek, gives notice that a meeting will be held at Room 56, Flood Building, San Francisco, Cal., on September 30, 1901, at 1:30 P. M.

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## ASSESSMENT NOTICES.

**THE CALIFORNIA DREDGING COMPANY.**—Principal place of business, 120 Sutter Street, San Francisco, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 13th day of September, 1901, an assessment (No. 2) of \$10 per share was levied upon the capital stock of the corporation, payable immediately in gold coin to the secretary of the corporation, at the office of the company, Room 56 120 Sutter Street, San Francisco, California. Any stock upon which this assessment shall remain unpaid on MONDAY, the 21st day of October, 1901, will be delinquent and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 11th day of November, 1901, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

**SAM W. CHEYNEY, Secretary.**  
120 Sutter Street, San Francisco, California.

**MARIPOSA COMMERCIAL AND MINING COMPANY.**—Location of principal place of business, San Francisco, California; location of works, Mariposa County, California.

Notice is hereby given that, at a meeting of the Board of Directors, held on the 11th day of September, 1901, an assessment (No. 2) of Ten Dollars per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin to the secretary, at the office of the company, Room 221 Crocker Building, San Francisco, California. Any stock upon which this assessment shall remain unpaid on the 21st day of October, 1901, will be delinquent and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 11th day of November, 1901, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.  
**ALEX. GRANGER, Secretary.**  
Office—Room 221 Crocker Building, San Francisco, California.

**MARINA MARICANO GOLD MINING COMPANY.**—Location of principal place of business, San Francisco, California; location of works, Sunny Hill, Shasta County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 7th day of September, 1901, an assessment (No. 2) of one (1) cent per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin to the secretary, at the office of the company, 217 Sacramento street, San Francisco, California. Any stock upon which this assessment shall remain unpaid on the 14th day of October, 1901, will be delinquent and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 4th day of November, 1901, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.  
**GEAS. BOVONE, Secretary.**  
Office—217 Sacramento street, San Francisco, California.

**YUBA CONSOLIDATED GOLD MINING COMPANY.**—Location of principal place of business, San Francisco, California; location of works, Nevada County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 19th day of August, 1901, an assessment (No. 3) of three cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin to the secretary, at the office of the company, Room 801 Claus Spreckels Building, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 24th day of September, 1901, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 14th day of October, 1901, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.  
**EDWARD H. STERN, Secretary.**  
Office—Room 801 Claus Spreckels Building, San Francisco, California.

**OSCEOLA CONSOLIDATED MINING COMPANY.**—Location of principal place of business, San Francisco, California; location of works, Plymouth, Adams County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 28th day of August, 1901, an assessment (No. 12) of one (1) cent per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin to the secretary, at the office of the company, 307 Montgomery street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 30th day of September, 1901, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 28th day of October, 1901, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.  
**HOLLAND SMITH, Secretary.**  
Office—307 Montgomery street, San Francisco, California.

**YUMA PETROLEUM COMPANY.**—Principal place of business, San Francisco, California. Location of works, Fresno County, California.

Notice is hereby given, that at a meeting of the Directors, held on the 22nd day of August, 1901, an assessment of ten (10) dollars per share was levied upon the capital stock of the corporation, payable immediately to the secretary, at the office of the company, No. 816 California street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 24th day of September, 1901, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on the 14th day of October, 1901, to pay the delinquent assessment, together with costs of advertising and expenses of sale.

**R. F. MALEOD, Secretary.**  
Office—No. 816 California street, San Francisco, California.

**WILLIETTA MINING & MILLING COMPANY.**—Location of principal place of business, San Francisco, California; location of works, Tuolumne County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 13th day of August, 1901, an assessment (No. 2) of one (1) cent per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin to the secretary, at the office of the company, Room 8, 206 Sansome street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 30th day of September, 1901, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 21st day of October, 1901, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

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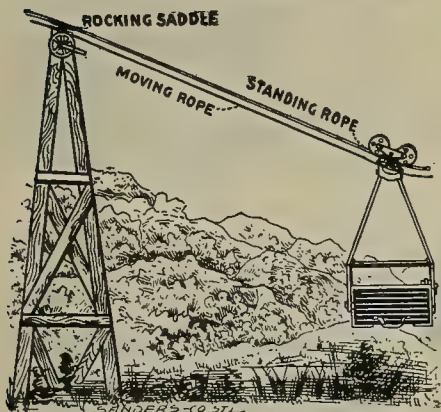
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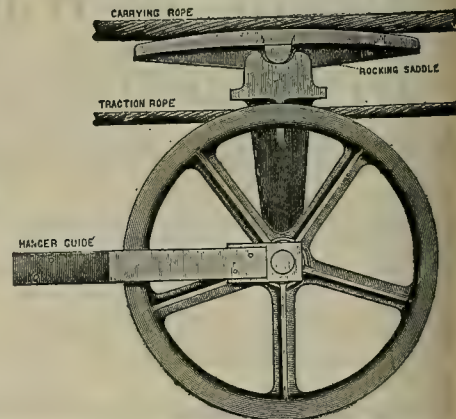
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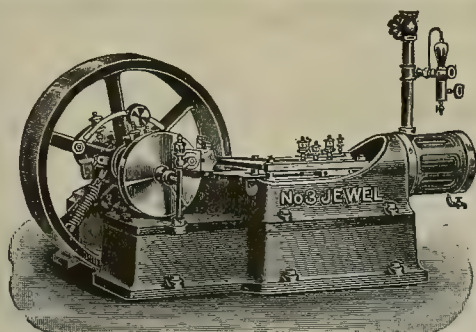
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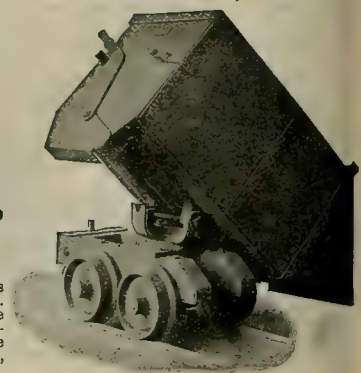
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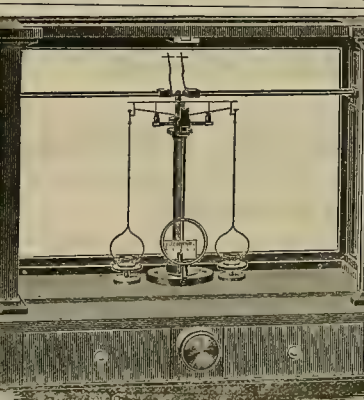
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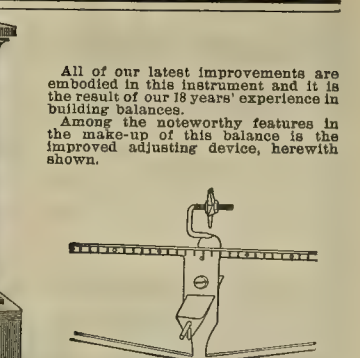
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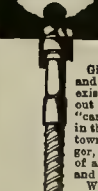
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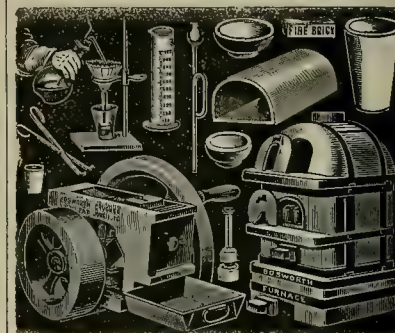
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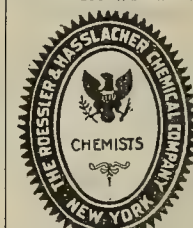
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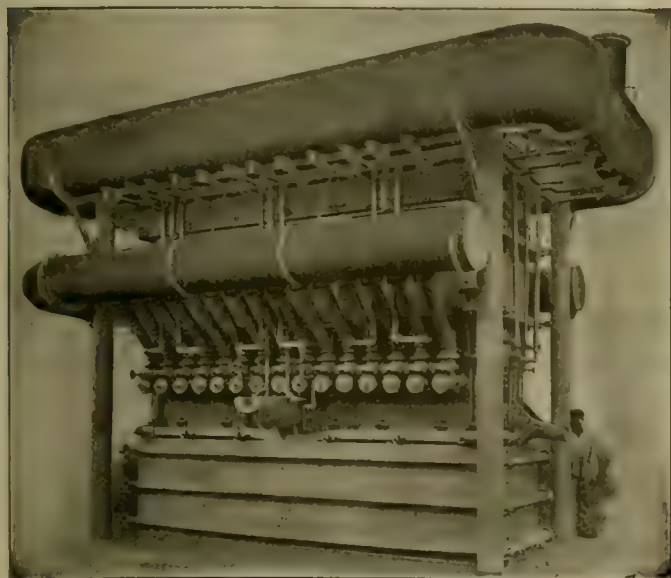
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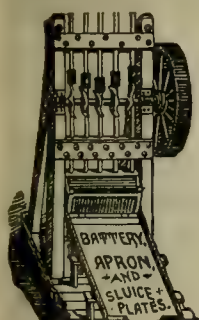
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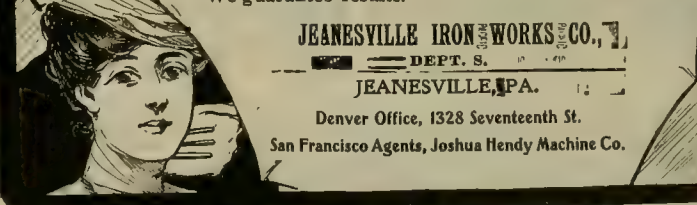
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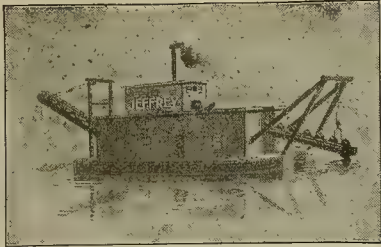


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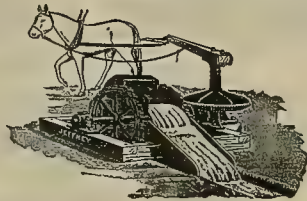


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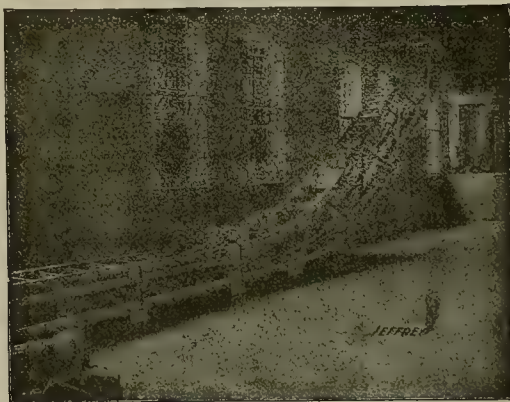
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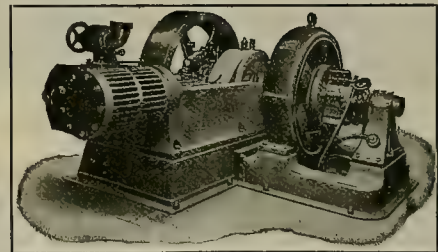
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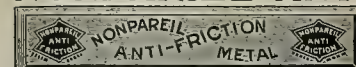
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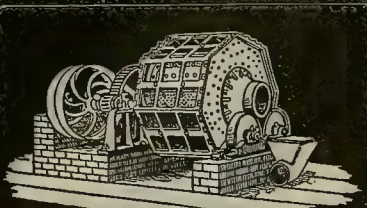
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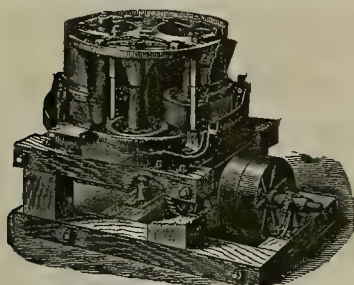
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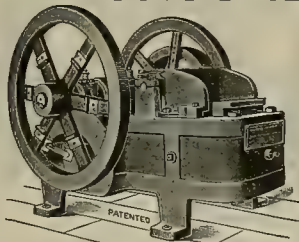
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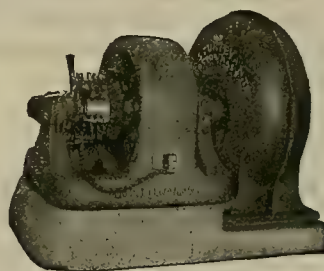
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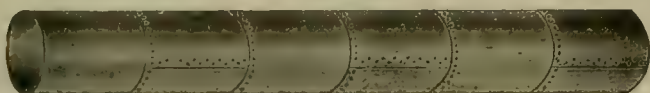
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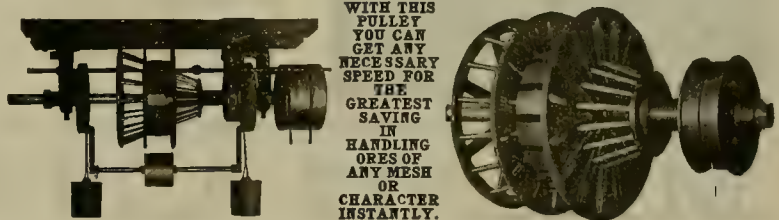
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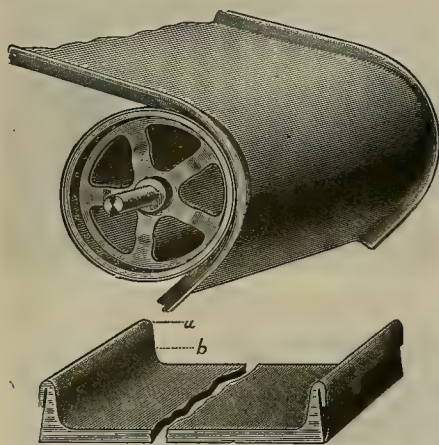
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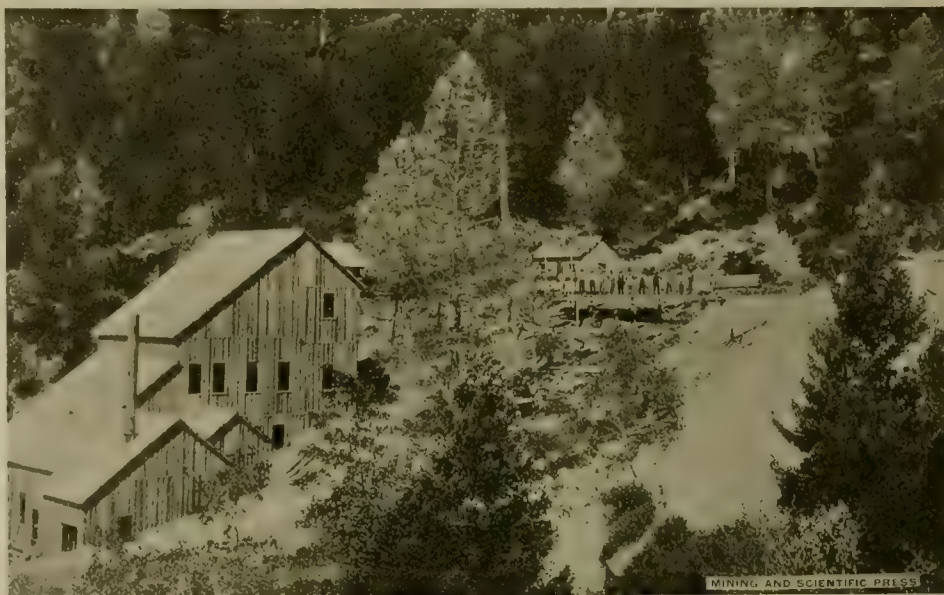
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## Submarine Oil Fields.

To find mineral deposits, that habit of the mind has always associated with the mountains, or at least with the dry land, being commercially exploited under the sea is always a fascinating novelty. It is probable that the Nome placer discoveries, coming when many of the disappointments and hardships of the Klondike were fresh in the public memory, would have received much less attention and fewer people but for the statements that the sands of the Arctic beaches there were profitably gold-bearing. It was reasoned that if the beach contained gold the sea bed must contain more, and the hope of getting it by dredgers and pumps was the basis for the investment of large sums of money in machinery that the physical conditions proved unavailable.

Mines in the sea bottom are not modern. Tin mines in Cornwall, England, many years since commenced to extend their drift workings out under the sea from shafts on the shore. On Lake Superior a silver-copper mine beneath the lake bottom has been mined from a shaft on an island scarcely large enough for the mine buildings. In Japan coal is mined from Takishima and other of the smaller islands—or, rather, islets—far out from under the sea. In all of these instances the visible works are all on the land, the surface of the sea is unfretted with the structures that work out the earth depths beneath the waters.

California, however, has the exceptional instance of sea bottom exploitation where all the structures and mechanical appurtenances of the mining spring from the surface of the sea. The illustration on this page of the Summerland oil field, in Santa Barbara county, is of the derricks, piling, and wharves of this unique and successful commercial exploitation. Some years ago an "oil line," a rock formation yielding petroleum, was traced by producing wells to the sea



The Washington Mining Company's Mill, Bath, Placer County, Cal. (See Page 130.)

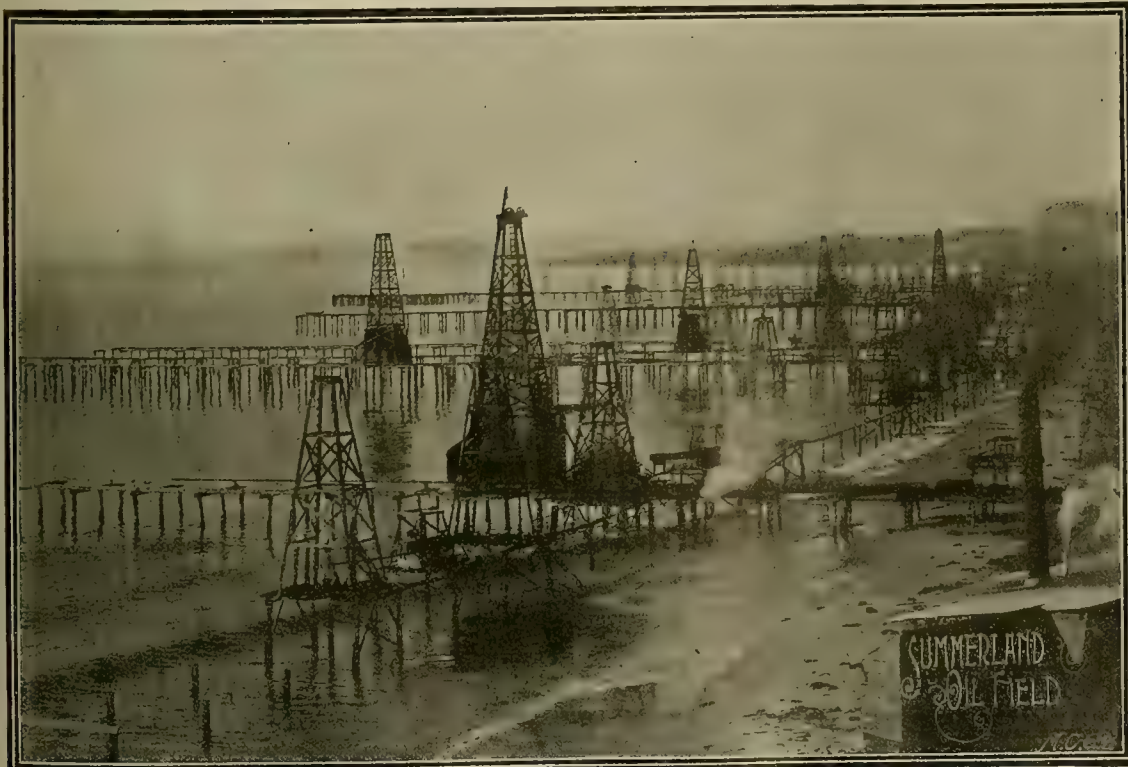
shore. Continuing to yield petroleum from the wells at the water's edge just as wells farther inland did, the extension of the formation beneath the sea bed was inferred, and wells were driven from foundations on piling to test the theory. These have multiplied, for the sea was believed to be no man's land, and reclaimable to the extent only that it could be reduced to actual occupancy. The industry illustrated is the result. Within a small area are very many wells, from which oil is pumped up through the sea water and delivered into tanks on shore or afloat at the wharves. The production of the individual wells is

not large—there are no spouting gushers—but the aggregate has made a commercially desirable business.

The place of this unique industry is well named—Summerland. On few shore lines of the open sea—for Summerland is not a land-locked harbor—is the sea so continuously undisturbed and the season so perpetually summer that such operations as are here illustrated could be possible.

The Baku oil fields in Russia, on the shores of the Caspian sea, are very old, but only during the last few years has any study been made looking toward

exploitation of the formation beneath the waters. The Russian Government is now satisfied that the deposits of petroleum extend out beneath the sea and several points have been selected—in depths of water from 14 to 50 feet—where exploitation is being considered. Some practical difficulties are delaying the initiation of work. It appears that the oil from the wells comes up mixed with considerable sand, the separation of which at wells off shore is not yet considered practicable except at an enormous expense involved in building sea-walled enclosures. The idea of pumping sand and oil together to the land through submarine pipe lines under pressure is not mentioned as having been considered. There would seem to be no serious difficulty involved in this method. The Government is preparing to drain Romany lake, in Baku district, so that wells can be sunk in its bed to test the oil-bearing value of the formation before constructing costly reclamation works in the Caspian sea. Precisely why, in such quiet waters as Romany lake must be, the Summerland type of exploitation should not be practicable is not clear. Possibly the reason is that the Russians know nothing about what has been accomplished at Summerland. They should employ American engineers.



The Summerland Oil Field, Santa Barbara County, Cal.



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## Low Grade Mines.

Statements concerning the profit earning possibilities of low-grade mines as they are ordinarily given out to, and accepted by the public, are on the whole misleading. Possibly that is the intent with which some are started, but it does not excuse their unreliability, even though it explains the reason for it. The danger consists in the setting up of a false standard of valuation for mines.

The low-grade mine is ordinarily an example used without any qualification, to make a direct comparison with a different kind of a mine. For want of an exact accepted definition, a low-grade mine is loosely taken to mean a mine yielding gross market values of metal as low as the particular example. Gold quartz mines that are made to pay on \$2 ore, quicksilver mines that show a profit on paper with one-third of one per cent quicksilver ore, copper mines that pay more than expenses with three-fourths of one per cent of copper when copper sells at 17 cents a pound, are all popularly considered much the same kind of low-grade mines. In reality they are not at all the same thing. The gold mine that pays with \$2 a ton ore is the true low-grade mine, made by nature an opportunity, and as such improved by man. The quicksilver mine with .33% ore is not a mine at all. It is only near enough to it to be a school from which to get experience at not too high a cost. The  $\frac{1}{3}$ % copper mine as a low-grade mine for profit is a mistake. There may be a profit with copper at 17 cents, but it vanishes with a slight downward change in the market price of the metal. The chance of profit should not be taken.

With the exploitation of low-grade gold mines one must feel the way by trials on successively larger scales. There is no deductive certainty that the experience of exploitation of one mine is going to duplicate itself in another. The only safe way is to be liberal in insisting on a considerable profit margin for a new proposition over that found by experience in the old one. With so-called low-grade mines of other metals it is a question of the maintenance of present metal prices. The permanent tendency of lead, copper and zinc prices is downward. The much greater aggregate of mining operations for these metals has a constant tendency to increase the production of the metal from high-grade ores and to depress the sale price of the metal. The effect is to raise the minimum grade at which the ore can be profitably mined. It is good business to discount this tendency in advance. Big low-grade propositions may figure into metal very fast, but into profits not at all.

The cost of mining and treatment of the unit of

ore is a fairly fixed fact from which to begin estimating. The average metal content of the ore should be able to balance this from sale prices much lower than at present. Here is where a difference may come in between mines. With minable ore bodies of the same magnitude and average metal content, one may have the metal uniformly distributed in the ore, and the others have more or less of its metal concentrated so that it can be mined separately. The latter can stand the lowered values of lower prices by restricting the mining to the portion of the ore body containing the concentrated metal. The first described cannot stand the lowered price, for it must be all minable at a profit or none of it is. It is this kind of a mine that is apt to become a disappointment as an investment for profit from low-grade ores.

## Practical Use of Card Indexing.

Requests come to this journal with increasing frequency asking for suggestion as to a book on this or that special mining or metallurgical subject. Sometimes it is possible to give an answer without a qualification, but more often it is not possible. There are many books on these special subjects of special excellence, yet they fail of meeting the requirement which has prompted the inquiry. The fact is that the practice of mining and metallurgy has become specialized, and has advanced in specialization lines more rapidly than the explanatory and descriptive books have been written and published. The latter are unavoidably more or less behind the most advanced practice. Herein is the qualification that goes with the answer to the inquiry. The book or books are good, are indeed the best or the only publications on the special subject—but they are short at just the point that completeness is desired.

The complete, up to date, information that the inquirer wants, is in most cases to be found in the files of technical journals, the MINING AND SCIENTIFIC PRESS preferably of all that can be suggested, as most completely covering the largest number of the special technical subjects of inquiry. This paper has ever had in view this purpose, and has accomplished during the entire forty-one years of its publication the early presentation to its readers of the useful facts concerning the successive forward steps in every special sub-branch of the arts of mining and metallurgy. That it has been successful in its purpose is due very largely to the unselfish assistance and unflinching courtesy of its readers who have from their own experience and knowledge contributed to this useful record of technical facts.

This journal is constantly in receipt of appreciative comment on its utility to its readers in being the latest and most complete text book in the art. Many readers subscribe for two copies, one being desired for filing complete and the second for clipping on special subjects. A common order is for complete bound files for several years of back numbers, the information on special subjects being that number of years in advance of published text books.

From the testimony of past service, direct and indirect, and all unsolicited, it is strongly advised that the readers of this journal preserve it in complete files. For usefulness for general purposes of reference an index is published at the end of each six-month volume. While there is much cross reference and indexing under several heads it is appreciated that for the service of the specialist this index does not meet the requirements. It is recommended that for this service each specialist prepare a special card index of the matter relating to his specialty. This is a service, that if one would get value received, one must do it for himself from his personal point of view. The specialist's point of view is not academic and recording, but constructive and doing. The way to learn to do something is to do it. Knowledge of what others have done and are doing is the workshop for one's own accomplishment. It is in every instance best constructed as a workshop, when it consists from the beginning of the personal systematization of current and past knowledge.

This card index should be made as the paper is read—complete of each number of this journal as it passes under the eye and through the mind. The indexing is the mental digestive act of assimilating. Be it much or little that appears in any one number of this journal touching the specialty, whatever it is

should be appropriated warm, not warmed over. Possibly it is only a paragraph or a sentence in an article on a subject as a whole not germane, but it should receive its index note just the same. The question of relative proportion in value of the indexed notes comes up for determination later. The advertisements that appear in this journal should not be overlooked. Every special subject has its special operative mechanisms. Knowledge of them is vital from the ultimate commercial resolution of the special subject. A complete card index should include such reference to the trade advertisements of special machines, that the hint to get the advertiser's trade catalogues, which are invariably up to date at one or more points on the subject, is not forgotten.

While the card index for the special mining and metallurgical subjects as here considered has for its base a complete file of this journal, it will suggest itself that it should be inclusive of all publications that come to the specialist's eye. The preservation of the MINING AND SCIENTIFIC PRESS in complete files is advised, because no other single journal will afford as many or as full reference notes, and on many subjects it will contain the majority of all possible references.

On another page are given copies of a few cards, selected at random from more than ten thousand cards of an index, made of California mines by an attorney for service in his professional work.

They will serve to illustrate the method and to demonstrate its business value. The attorney, in any litigation relating to any one of these mines, has at once before him all the published information from which to pick evidence, with the minimum expenditure of labor. The metallurgical chemist specially interested in the cyanide process, should in a similar fashion prepare a special card index of references to the cyanide process. The manager developing a copper mine should have at his service a similarly prepared special card index of references to copper mining and copper metallurgy. Not alone would specialists, by the close touch thus given with everything that has been done, be the better advised as to selection of the best for a particular service; but, knowing all that is known, it becomes much easier to think and reason and discover that which will be new, and may be valuable, from the vast possibilities of the yet unknown.

THE receipt of two inquiries—one from Colorado, another from Oregon—asking if \$50 would be a fair price for a "mining report" or a "mine test" indicates some mental haziness regarding some facts. Cheap and dear are relative terms. Cheapness is usually regulated not by what one pays, but what he gets for what he pays. A mining report may be worth \$50,000 or 50 cents—much depends. A mine test that would cost \$50 would probably be worth that much. One that would cost \$5000 might be the cheaper of the two. It is impossible to give accurate reply to either of the questions. A "mine test" involves so much: the kind of a mine or prospect it is; the cost of getting there; the kind of ore; its extent and value; the amount of development; assaying; treatment of ore; the fee of a competent mining engineer and his assistant; the extent of the required report, that is, how much it shall include. We have seen a mining report, from a man claiming to be a mining engineer, that cost in toto \$25. We have also seen a mining report that cost \$25,000. There are not a few mining engineers who will not take up anything in the way of a mine examination for less than \$1000; there are more who can be had for from \$25 to \$50 per day and expenses. It is not, however, a matter that could be determined by competitive bids. A valuable report is worth all it costs, and in this, as in other things, true economy consists in judicious expenditure. A \$5000 report can be cheaper than one costing \$50. The man making the \$50 report would very probably have honestly earned his money and given value received, but so much more value might be given for the \$5000 report that it would be the cheaper. A report upon which may be based the expenditure of considerable money can not ordinarily be secured for a trifling sum. Better employ a competent man of reputation and experience and pay what such experience and reputation is justified in charging. It would be cheaper in the long run—or the short run.



## Concentrates.

THE Spanish unit of length measure is 32½ inches, the California vara established by statute is 33 3/72 inches or almost one-half inch greater.

THE tin covering of tin plate is from 1½ to 3¼% of the total weight of the plate. A small plant in San Francisco is said to be recovering 2% from tin clippings.

AS A GENERAL RULE, work drill steel at as low a heat as possible and avoid overheating it at any time. Excessive heating abstracts some of the carbon and to that extent impairs the quality.

IT is preferable to lose the cost of dynamite blasting powders that are very old, particularly where there has been much alternate freezing and thawing, rather than accept the risk involved in its use.

THE cost of chlorination treatment of concentrates is from \$8 to \$30 a ton, dependent on quantity and location. With cheap transportation a saving can usually be made by having them smelted at a custom smelter.

THE world's rock-drilling record was made at Spokane, Wash., on Sept. 24th, by Bradshaw and Freethy, the Butte team. Drilling fifteen minutes, they went through 55 inches of granite. For this they won a purse of \$500.

DIAMOND DRILL contractors in the Rand, South Africa, are reported to have contracted to drill holes 4000 feet deep at the rate of \$10.25 a foot, and it is estimated that, with incidental expenses, the cost of sinking would reach \$11 a foot.

A FRESNO, CAL., company has been incorporated to build a 43-mile line of electric railroad in the San Joaquin valley, the idea being to use, electrically transmitted, the cheap water power of the streams in the adjacent Sierra Nevada mountains.

THE gold-bearing ores of the Black Hills have been successfully worked by free-milling, followed by concentration and chlorination, by free-milling followed by cyanide treatment of the tailings, by smelting, and by what is termed pyritic smelting.

A FRENCH COMPANY has been engaged for some years in mining coal on the Island of Saghalien, near the southern end. Russian convict labor is employed. The coal is inferior in quality to the Japanese and the business has not been regarded as very profitable.

THE water of Lake Mono, in Mono county, Cal., is said to contain, in 100 parts by weight, 17.637% of solids. These are: salt 5.854%, potassium chloride 1.581%, calcium chloride 2.630%, magnesium chloride 8.206%, sulphate of calcium 0.402%, and sulphate of magnesium trace.

THE telegraph line has been completed from Quesnelle to Telegraph creek in British Columbia, and on the 24th of September the first message was sent from Vancouver, B. C., to Dawson on the Yukon. The lines from there down the Yukon will shortly put Circle City and Nome, in Alaska, in telegraph communication with the United States.

A MICROSCOPIC SLIDE examination of copper sulphide ores taken out of lodes at about and even below the permanent surface water level shows evidence of secondary enrichment in minute lines of chalcopryite traversing the other mineral, so as to indicate its deposition from solutions flowing through previously opened fracture lines.

CALIFORNIA mining companies very rarely make public either their production or their dividends. Aside from the sentiment that it is not the public's business to know these facts, there is a belief surviving from the early days of California that their publication was an advertisement for the benefit of highwaymen and assessors.

WHILE there is no requirement of the statute making it obligatory to maintain the original location monuments of a mining claim, once they are placed in conformity with the statute, it is a wise precaution to do so. It is a protection against unintentional trespass, and an important matter when the deputy mineral surveyor comes to survey the claim for a patent.

THE Canadian Yukon Gold Commissioner has decided that a hillside claim could be located adjoining a creek claim where the creek bottom is so wide that after allowing 1000 feet width for the creek claim there was still more than 1000 feet before the land rose into hill slopes. The contention of adverse claimants has been that under such topographical conditions the location should be of a bench claim which is allowed only 250 feet of width. This, if sustained, would have given to the contestants 750 feet of the first locator's claims.

A CORPORATION mining in Alaska must appoint a resident agent on whom service can be made in the event of litigation. A statement must be filed with the agent's acceptance of appointment, giving the capital, assets and indebtedness of the corporation. These papers have to be filed in duplicate, one copy with the Secretary of the District and one copy with the Clerk of the District Court. The latter makes no fee charge, the former charges \$10 for filing, but there is no obligation to pay it, as the law makes no provision for filing fees for these papers.

THE Commissioner of the General Land Office at Washington has ruled that mineral claims cannot be filed on Indian allotments of land in the portions of

Indian Territory recently opened to settlement as part of Oklahoma, except by the consent of the allottees, and that the Land Department cannot recognize them even then. The ruling is in effect that the allotment of land to the Indians is a grant without reservations of mineral. The ruling has heretofore been made that Indian reservations outside of Indian Territory are not open to mineral exploration or location of claims.

SUPERHEATED STEAM is saturated or wet steam to which an additional amount of heat has been given. It is a bad conductor of heat and is able to lose a certain amount of heat without becoming wet steam. Superheated steam has a greater volume per unit of weight than saturated steam at the same pressure, which is an advantage which increases with the temperature. Superheated steam engines use on an average 30% to 40% less steam than saturated steam engines of the same type and require correspondingly less boiler capacity. For the same steam consumption the superheated engine is the cheaper.

THE coast prairie, of which the Beaumont oil field is a portion, extends nearly 400 miles from western Louisiana through Texas into Mexico. It is almost a level plain, rising from the Gulf of Mexico inland about 1 foot to the mile. There are slight irregularities or undulations in this plain that from observation and study are supposed to have a definite relation to the occurrence beneath them of oil. The plain is believed to be rising and suffering deformation by folding. The Beaumont discovery is on a dome-like uplift or mound only 10 feet higher than the plain around it. Others have been noted, and the conclusion has been drawn that the oil occurs in underground pools which underlie dome-shaped anticlines in the new made coast prairies.

A STANDARD silver solution can be prepared by weighing out exactly 17.00 gr. of pure silver nitrate and dissolve in 1 litre of water, or weigh out 10.8 gr. of pure silver, dissolve in nitric acid, dry and dilute to 900 cc., neutralize with sodic acid carbonate ( $\text{HNaCO}_3$ ), and then dilute to 1 litre; each of these solutions contains per 1 cubic centimeter 0.0108 gr. of silver, indicating 0.00355 gr. chlorine, or 0.00365 gr. hydrochloric acid, or 0.00585 gr. sodic chloride. To test, weigh out 0.0585 gr. pure salt ( $\text{NaCl}$ ), dissolve in water to which a few drops of neutral chromate of potassium solution is added. With a burette, pass 10 cc. of the silver solution into the solution and it should precipitate out all the chlorine, one drop excess of the silver solution giving a red precipitate.

A LEAKY earth dam should not have its structure disturbed by digging for the leak while the reservoir is full of water behind it. An excellent plan is to dump earth and clay into the water inside of the dam at the point that is leaking. If the leak is not very large or just starting sufficient will be taken into the opening by the water to close it up permanently. If it is clear that the leak cannot be closed by this method, empty it of water by the gates. The level of the water when the leak stops flowing shows the level of its interior start. From a little above this on the inside slope of the dam dig down till well below the line of the leak, stepping down the sides of the trench. Build in this trench a puddle wall, using a thin puddle and building up gradually till the slope of the dam is reached.

WITHIN mechanical and commercial limits, the latter really being the more controlling, the number of revolutions of a hurdy type water wheel shaft can be made to suit the economic conditions of the machinery operated from it. The spouting and impact velocity in feet of the water jet is known from the pressure head in feet of the water. The working rim speed of the water wheel where the jet impinges on the buckets is exactly one-half of the spouting velocity. With this speed fixed, the number of revolutions varies with the circumference of the wheel. To determine the circumference for a desired number of revolutions per minute, multiply one-half the spouting velocity of the jet in feet per second by sixty and divide the product by the number of revolutions. The diameter of the wheel is obtained by dividing the circumference thus obtained by 3.1416.

THE discoverer of a gold placer in Siberia has the right to locate one square verst of surface on discovery. He is not, however, permitted to mine this at once, but must apply to the Governor General at Irkutsk for a survey, for which he must deposit a sum equal to about \$150. This survey is made by a Government mining engineer, and the applicant, who has had the right to prospect meanwhile, must select one-fourth of one square verst from the full area he has located, to which his claim is thereafter limited. When the survey is completed and filed he is granted the right to mine under the supervision of a Government engineer, whom he must pay. It happens, usually, that not less than two years are required between the date of discovery and the granting of the right to mine. An American miner would figure on working the claim out in less time.

THE joining lines between the wood timbers and plank of the outlet gates of the shallow reservoirs, commonly built at the heads of hydraulic pipe lines of placer mines, are made tight by puddling in the clay or dirt so that it settles in compact and tight during construction. The puddle is kept very nearly at the consistency of a thin mud during the building. With this practice it is unusual for leakage to occur. Where concrete, brick or stone masonry is employed for the pipe head works in the earth-built dam of such a reservoir, it is desirable to carry out from the masonry construction core walls of concrete or masonry into the body of the dam at both

sides. These walls should go down to the same solid tight formation as the main structure. In building up they can be stepped back from the foot to a disappearing point at the water level line of the reservoir. Smooth finishing such a wall is to be avoided. It is desirable to have it rough in surface. The earth composing the dam is built up at the ends of the gate structure and along these binding walls by puddling, as described above. The irregularities of surface aid in keeping in place the material once settled. Water channels cannot form along it as along a smooth, straight wall.

THE Trans-Siberian railroad, now well along toward completion, traverses an entirely different section of country from that of the projected Trans-Alaska-Siberian railroad from Dawson, crossing Behring's straits to Irkutsk. The former is built along substantially the line of the Imperial post-road through the center of the line of Russian settlement and on the route of the enormous caravan trade from China overland to Russia. It has provided a better and cheaper facility for a traffic than exists and for people with already established business. The projected road is for the most part through an all but unknown wilderness, without population or traffic except such as the road may itself build up from unknown natural resources. The mines of Alaska are not considered in this, as they have natural transportation facilities so cheap that a railroad cannot displace them.

A CURIOUS phenomenon in connection with the distribution of placer gold has been noticed in Alaska. To some of the lakes in the interior the streams come down with torrential grades. When the warm weather of spring comes, the snow on the mountain slopes begins to melt and the streams to flow before the heavy ice in the lakes breaks up. The water of the streams thus for a greater or less period flows out from the shore on top of the ice and carries with it gold-bearing gravels, which, till the ice melts, remains on top of it. Prospectors panning these gravels have found light gold, which indicated the existence of possible placers in these stream gravels. When the shore ice breaks up and floats away the gravel is transported with it, till the melting of the ice causes it to sink through the lake waters, to become part of what, when the lakes have disappeared, are called by geologists "lake beds." Fine gold so distributed is not at all concentrated, and there can be no bedrock deposits underneath these lake beds. The latter are not known to have been found sufficiently rich in gold to be "pay" for placer mining.

UNITED STATES DEPUTY MINERAL SURVEYORS are not prohibited from making locations of mining claims. They are not prohibited from making mineral entries for patent within the district for which they are appointed; but they cannot in that event act in any other capacity than as claimant. They cannot act as attorney in their own case. They cannot officially survey their own entries. A deputy surveyor may make a location of a claim and make a grant of it to another who can apply for patent and have the official survey made by the locator and grantee. But the locator and grantee cannot make the survey if the grantor holds the title as trustee for the deputy surveyor in order to get the patent. The reason in this is that the law will not make lawful an act done indirectly which could not lawfully be done directly. The Land Department does not make law, nor finally construe it. The statutes do not specifically exclude a deputy mineral surveyor or from the exercise of his right as a citizen to make mining locations. The department which appoints him as a deputy mineral surveyor may and does limit the capacity in which they may appear before the appointing office in any one case.

THERE cannot be two valid lode locations on the same surface at one time. Where the monuments of one claim come inside the boundaries of another, the location first made has the absolute right to the conflicting area. The other claim has the right to the position of its monuments on this conflicting area for the purpose of defining the limits of the claim that are exterior to the conflicting area. It does not seem as if under the statutes it would be possible to maintain title to surface ground which was not based on the actual title to the lode, the claim to which gave the right to claim with it contiguous surface. That is to say, where two claims conflict and the lode line of the junior location enters within, in whole or in part, the conflicting area, which is absolutely part of the senior location, the surface of the junior claim which is contiguous and appurtenant to the lode line within the conflicting area, cannot be held under the junior location. In the case that the lode line of the junior claim is wholly within the conflicting area, it seems clear that the junior claim is void from the beginning, because there could be no discovery within the senior location surface on which a location could be based. Where part only of the lode line is within the conflict, and the discovery is outside of it, the claim to the lode line is only valid for the portion outside. Logically it should only be valid for surface that is contiguous to that outside portion, and the real end line of the junior claim from the point of termination of the lode line is not the boundary line of the senior location, but a line from this point parallel to the end line that is located from the end of the lode line outside of the conflict. The exact point made here does not appear to have been passed on in litigation. The practice of United States deputy mineral surveyors, acting under instructions, has been to so make a new end line in surveys for patents.



## A Laboratory Amalgamating Device.

Written for the MINING AND SCIENTIFIC PRESS by H. S. GUESS.

About three years ago an account was given of a laboratory amalgamating device, together with some data of comparative results. At that time the method had been in use some six months, and the results at that time had been found to satisfactorily accord with those of the mill. Since then, and up to the present, this device has been in regular use, and has in every way fulfilled its early promise of usefulness.

It was thought, therefore, that a short description of it and its work again at this time, together with further comparative data, might prove of some interest.

At the customs milling plant of the Ottawa Gold M. & M. Co., Keewatin, Canada—in connection with which there is a sampling works—free-milling ores are treated in lots of various sizes, and it is optional with the shipper whether he have his ore sampled and purchased on the laboratory determinations of his amalgamable gold, or whether he have it actually run through the mill batteries, and a separate clean-up made, (an extra treatment charge being made in the latter event).

In making the laboratory amalgamation tests on each sample, agitation of the pulp in stoppered bottles with mercury and water was found to be the most rapid and satisfactory. The device itself will readily be understood at a glance from the accompanying illustration. Vertical agitation is given to a little



table running between guides, and on which are clamped the broad-mouthed bottles, the throw being by 2-inch eccentric run at 350 revolutions per minute.

Series of experiments were made, using the same pulps and the same proportion of mercury, but different periods of agitation, to see the time beyond which no further amalgamation would take place. Twenty minutes were found quite sufficient, but in practice thirty are used. The method is briefly thus: The pulp from the sampling works is passed through a screen of the equivalent of the mesh of the mill—usually 40-mesh; from this a portion is taken at 120-mesh, on which from one-half dozen to three dozen assays—depending on the richness and size of the lot—are made to determine the total gold contents: from the 40-mesh portion, from three to ten charges of 100 grammes each are weighed into wide-mouthed glass-stoppered bottles, water and mercury (about ten grammes) added, and the stoppered bottles put on the agitator for about thirty minutes. The contents of each bottle are then panned separately, the mercury panned out and discarded, the sulphide concentrates panned out, dried, weighed to determine percentage and dumped into an assay crucible, the resultant gold being calculated on the basis of the 100 grammes charge of ore, the value per ton of concentrates being obtained by calculation back. The tailings and slimes are evaporated, put through 120-mesh and the assay value determined. The means of the values thus found for the concentrates, and for the tailings, are then taken, and the amalgamable gold determined by difference from the total gold contents value. The comparatively small quantity of

100 grammes taken and doing a sufficient number of "checks," has been found to be more satisfactory than using a larger quantity, as, in the after separation of the mercury, concentrates and tailings, the smaller quantity is susceptible of much more delicate manipulation, and the operation can be carried out with the nicety of a chemical analysis; small, 10-inch diameter aluminum pans with rather steep sides being used for the panning. In order to test the accuracy of the method thoroughly, the different small lots, after being sampled and purchased on the determinations thus made, were stored and run through the mill separately, the bullion assayed by itself and the results compared with the previously determined laboratory results. This proved so satisfactory that after a time the small lots were allowed to accumulate and several run through the mill together. The results were found equally satisfactory, so that the small lots are now all dumped together in the storage bins and no separate clean-ups made.

In the concentration of the sulphides a factor had to be used in determining mill results, as closer concentration could be made in panning in this way in the laboratory than could be done by the mill equipment. The concentrates are, however, in this locality of small account and value.

The method here outlined has enabled the company to handle small ore shipments at a milling rate impossible, were a separate clean-up made, and is valuable as a method of testing laboratory samples to give a close approximation of actual mill results. It is also useful in investigating tailings to see if any amalgamable gold at that mesh is escaping, and is used at this plant for that purpose, as well as for the original determinations of saving.

It finds its best application on free-milling ores with a low percentage of concentrates, and has proven of considerable value to the work here in hand.

Some little experimenting was necessary at first in determining the type of grinding, and the mesh in the laboratory, equivalent to the mesh of the mill with the height of discharge there used; but a series of screen analyses of the pulps from both gave the desired means of adjustment.

Below are given the results on a few of the ore lots which were afterwards checked by separate clean-ups in the mill, some of them being as single lots, and some the contents of a bin made up of several lots in which the proper average of the combined lots had been calculated in the laboratory results:

| Ore lot, No. | Net weight, tons | Laboratory Assay value, \$ per ton | Free gold, \$ per ton | Total free gold, \$ per lot | Mill clean-up | Laboratory variations, % of total value |
|--------------|------------------|------------------------------------|-----------------------|-----------------------------|---------------|-----------------------------------------|
| A...         | 18.8             | \$24.70                            | \$20.50               | \$385.40                    | \$390.29      | 1%                                      |
| B...         | 22.8             | 24.08                              | 20.90                 | 476.50                      | 468.60        | 1.5%                                    |
| C...         | 38.0             | 4.12                               | 3.51                  | 133.38                      | 131.61        | 0.9%                                    |
| D...         | 49.5             | 2.53                               | 1.65                  | 81.67                       | 84.80         | 2.5%                                    |
| E...         | 195.97           | 14.42                              | 11.29                 | 2212.50                     | 2226.97       | 0.5%                                    |
| F...         | 84.5             | 10.40                              | 8.20                  | 692.90                      | 699.40        | 0.7%                                    |
| G...         | 110.2            | 12.15                              | 10.35                 | 1151.59                     | 1136.20       | 1.1%                                    |
| H...         | 329.4            | 11.20                              | 9.80                  | 3238.12                     | 3210.10       | 0.8%                                    |
| I...         | 446.2            | 7.50                               | 6.40                  | 2855.68                     | 2900.88       | 1.3%                                    |

Keewatin, Ontario, Aug. 26.

AN account of his discovery of the new element which he calls victorium has recently been given by Sir William Crookes, F. R. S., to the Royal Society in London. It has a pale brown color, and dissolves easily in acids. Its oxide is less basic than that of yttrium, but more so than the greater part of the earths of the terbium group. The chemical properties of victorium differ in many respects from those of yttrium, but, generally speaking, it may be said to occupy an intermediate position between this element and terbium. It is admitted that the oxide of victorium has the formula  $Ve_2O_3$ ; its atomic weight is not far from 17. The photograph of the spectrum given by the oxide shows certain definite lines which have not been observed with any other body. The spectrum is obtained by the incandescence of the body in a vacuum tube; the light given off has been analyzed by a spectroscopic of great precision, and the exposure upon a photographic plate shows a series of interesting rays in the ultra-violet region. In order to examine the negative an apparatus has been constructed which will measure to the one-hundred-thousandth of an inch.

THE bauxite deposits in Arkansas are, as far as known, confined to a small area lying south and southwest of the city of Little Rock. The region is about 20 miles in length and 5 or 6 miles in breadth, its longer axis extending northeast and southwest. It lies in the eastern part of Pulaski county and the northern part of Saline county. A second district, which is the more important one, occupies the southwestern extremity of the region, embracing about twelve square miles in Bryant township. Between these two sub-districts are several isolated deposits of ore generally without any associate igneous rocks, but so distributed as to connect the main deposits at the extremities of the region.

## The Washington Mine.\*

Written for the MINING AND SCIENTIFIC PRESS.

The Washington quartz mine, at Bath, was the first discovered gold-bearing quartz vein in Placer county, Cal., and is one of the latest to be equipped with a mill and made productive. It is situated in a locality famed even in California for an enormous output of placer gold, and for what is more uncommon still, long-lived placer mines.

The miners of 1849 and 1850 found a little section of the Middle Fork of the American river and Volcano canyon, leading up from the river by the Washington mine, remarkably rich in gold. Tracing upward in the minor side canyons and gulches, the old channels of Forest Hill and Bath were discovered by them, and at or about the same time the Hancock & Watson quartz ledge, now the Washington, was discovered. Later, in Volcano canyon, a number of other ledges were discovered.

The great richness of the placers and the inevitable mistakes with quartz mining in the '50s and early '60s led to the concentration of mining enterprise on the placers exclusively. While the cessation of mining on the quartz ledges was actually due to the mistakes of the mining and to the then superior attractiveness of the adjacent placer mining, the elapsed years of abandonment brought forgetfulness and misunderstanding of these real reasons, and made the local explanation of the neglect the easy one: that there was nothing in the ledges. The present successful operation of the Washington mine is proving that even local opinion can be in error in a declaration as to what is in a quartz ledge.

As a fact, the Washington ledge and other ledges of its immediate vicinity have an intimate connection with the rich mined-out placers of Forest Hill, Bath, Volcano canyon and the Middle Fork of the American river close at hand. The ledges are, in fact, the remnants still in place of the lodes, the erosion of which made the placers. The old Neocene Middle Fork of the American river, which Lindgren has described in his monograph, "Two Neocene Rivers in California," and in the Colfax Folio of the Geologic Survey, and which Ross E. Browne has mapped in the Xth Report of the California State Mineralogist, originally flowed from a location line about where the Middle Fork at Channel Bar now is but 1500 feet over it, northwesterly over what is now Volcano canyon, but in the reverse direction, to Bath, from which point it has been followed by the mining of the Paragon, Mayflower and Dardanelles claims around a great bend which brought the old stream under Forest Hill and nearly to the Middle Fork line again before it turned northwestward in the Dardanelles claim. Under the town of Forest Hill is the remnant of an old stream channel that preceded the Neocene river just described. Its line of flow would seem to have corresponded with the direction of the upper portion of Volcano canyon, that above Bath, crossing transversely, flowing west over the line of the Neocene channel where cut away by Volcano canyon.

The Geological Survey (Placerville and Colfax Folios) maps, show extending from Kelsey, in El Dorado county, to Bath, a belt of serpentines, the direct northward continuation of the mother lode eruptive formation developed in Amador and El Dorado counties. The characteristic Mariposa slates of the mother lode formation, at Kelsey changes from a northward to a northwesterward course. The latter is generally described as the line of the mother lode formations; but it is at least a question whether the mother lode formations do not divide at Kelsey, the eastern fork preserving the general direction of the lode to Volcano canyon and Bath, in Placer county. In Volcano canyon the serpentine formation is in contact on the east with slates and with diorite, the latter in wide dikes along the line of the main contact of the slates and the serpentine and in the serpentine. The west contact of the serpentine is with an amphibolite schist. On both contacts there are strong quartz lodes that are gold bearing, and in the middle of the serpentine is a large vein or altered dike with sharply defined walls, the hanging wall being a diorite dike. This lode is a variety of magnetite, carrying gold, but neither pyrite or quartz. A number of rich pockets have been mined from the surface of these ledges, and the old channel placers at Bath and Forest Hill were noted for the number of large quartz boulders containing gold that were found. The relative situation of the ledges and the placers in the existing stream channels is reasonably conclusive evidence that the placers were derived from the erosion of the lodes from 1000 to 3000 feet—if not, indeed, more—in depth. Over \$20,000,000 of gold are known to have been taken out of placers that must have its original situs in these lodes. Whether or not the remnants of these ledges that are still in place are as rich as the eroded portion must have been, is a question that is at the present time unanswerable.

The Washington ledge, as above stated, was early found to be gold bearing at the surface. It lies on the east side of the serpentine belt at a contact be-

\*See illustration front page.



tween it and a large body of diorite. It is a few hundred feet southwest of the old Neocene channel in the Paragon mine. The hydraulic pit on the rim of the channel contains many large boulders of float quartz from the ledge. The ledge is opened by a tunnel 1400 feet long. At the inner end it is 450 feet below the surface. From Volcano canyon it is practicable, by successive tunnels, to get 1000 feet additional depth, should the final result of exploitation in the upper level justify it. The width of the vein in the tunnel and stipes varies from 2 to 9 feet. The quartz is banded, of the variety known as ribbon rock. It carries visible free gold and high-grade gold-bearing pyrite associated with mariposite, the characteristic mother lode mineral first discovered and named in the mother lode mines in Mariposa county.

At the tunnel entrance is the mill, an illustration of which appears on the front page. It was recently put on the mine, and is the first mill on the ledge, except the small, inefficient affair used in the early '50s to work some of the rich pocket rock at the surface. It has ten stamps, automatic feeders, rock breakers and concentrators, all run by a 35 H. P. boiler and engine. The plant was built by the Union Iron Works of San Francisco. The mine is operated by the Washington Quartz G. M. Co., with H. T. Bells superintendent.

The enterprise is notable to the locality of Forest Hill as the initial enterprise looking to the development of a quartz mining industry. Its continued commercial success is expected to lead to the early development of other quartz properties, long overlooked at Forest Hill and Michigan Bluffs.

#### Existing Industrial Conditions.

Concerning strike conditions on the Pacific coast and elsewhere, in San Francisco the larger establishments, such as the Union Iron Works, the Risdon Iron Works, the Hendy, Vulcan, National Iron Works, and several others, are and have been in practically continuous operation, and while the strike goes on it is but one of the conditions incidental to the carrying on of manufacturing business. There is little activity in strikes north of San Francisco; in Los Angeles there has been no strike this year. East of the Rockies matters in that regard appear to be settling themselves. In Denver the shops are all full at good wages; in New Orleans machinists are working nine hours, being paid from 27½ to 32½ cents per hour, nine hours being a day's work. In Baltimore the nine and one-half hour day prevails at the old rate of pay, namely, \$2 to \$2.75 per day. In Philadelphia, which in some respects is the largest manufacturing city in the United States, there has been no strike. One concern in that city, the Baldwin Locomotive Works, employs nearly 8000 men, nearly all of whom are employed on piece work. The day with them is ten hours, their pay averaging from \$1.25 to \$2.25 per day. The same rule prevails in the big shipyards, Cramps and others, so far as hours and piece work are concerned, but in the shipyards the pay is from \$2 to \$2.50 per day for machinists and from \$2.75 to \$3 for molders. The same general rules prevail in the yards at Newport News and other southern points. In New York city \$2 to \$3 per day is paid for ten hours work. In the marine repair shops the nine-hour day is mostly in force, the pay running from \$2.75 to \$3 per day. The strike there is quiescent.

In sharp distinction to the methods in machine work and similar skilled labor on this coast, is developing specialized work east of the Rockies where regular machinists are largely giving place to men who are put to work at one special machine making special parts, who readily learn how to handle the machines and at the end of two months are receiving from \$1.25 to \$1.75 per day. The president of the Oakland, Cal., Iron Works, who recently made a tour of the principal machine shops of that nature, says that one of these special machines will turn out in a day as much as an ordinary machinist with ordinary tools could in three days, and that in the shops where they are employed 75% of the work is done on them. He instances one shop in Cleveland, Ohio, where he saw a machine of that nature bore 1500 bicycle sprocket wheels in ten hours.

In Buffalo, where considerable of the present agitation originated, the men went back under the old conditions about four months ago on a ten-hour basis, receiving from \$2 to \$2.50 per day. The same general conditions prevail in Cleveland, Ohio, and in Detroit, where there was a big strike, the average pay now being from \$2.25 to \$2.75 per day. In Milwaukee, where there has been a strike similar in cause and effect to that in San Francisco, the men have mostly returned to work on the ten-hour basis, wages there ranging from \$2 to \$2.75 per day. In Chicago the ten-hour day also prevails, the wages being from \$2.25 to \$3 per day. In St. Louis a nine-hour day was conceded with an increase of about 10% in the hourly rate of pay over that previously paid. In St. Paul and Minneapolis there was no strike, the men continuing on the ten-hour day basis at from 25 cents to 27½ cents per hour. In general the rate of wages paid to machinists and shop workers east of the Rockies is notably less than that paid for similar work on this coast.

## Chromite as a Hearth Lining for a Furnace-Smelting Copper Ore.\*

By WILLIAM GLENN.

That basic slag will rapidly destroy ordinary (i. e., siliceous) firebricks is known to every smelter; and the smelter of copper ores in particular knows that any kind of slag occurring in his practice is destructive. From this fact arises the chief distress of those who attempt to smelt copper ores in any manner of furnace constructed of bricks or stone, or other similar material. We have passed the firebrick stage of our experience; and now, having entered upon the period of the water-jacketed cupola, we will employ no furnace other than that having steel walls, kept cool by water.

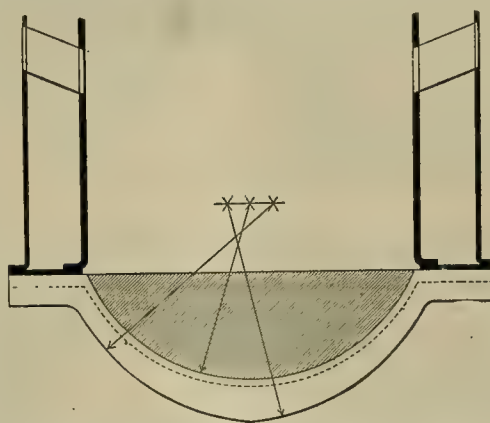
But, unfortunately, the bottom of a water-jacketed cupola, kept cool by another water jacket, fails of its purpose, being thereby made so cold as to chill both slag and regulus to a degree not bearable. The situation is more or less ameliorated when the upper surface of the water-jacketed bottom is covered with firebricks, since, so long as they last, they prevent the molten material from contact with the cold bottom. My own observation leads me to suppose that most smelters construct cupola bottoms of iron slabs, which are covered, to a greater or less depth, with firebricks. There are cupola bottoms which last no longer than a week; there are others which are said to last several weeks. But the ideal bottom ought to last indefinitely.

The mineral chromite (chrome ore) is not fusible. It is not attacked by the constituents or by any of the fusion products of copper ore. It is worn but slowly by the flowing of dense fluids over it. When heated and cooled, it does not become friable; nor is it subjected to unpleasant explosions when quickly heated to a high degree. Hence, it ought to prove an ideal mineral for the lining of a copper-smelting cupola.

At the Elizabeth mine, in Strafford, Vt., so long ago as 1882, the writer attempted to employ it in a water-jacketed cupola copper furnace, 48 inches in diameter. But the ore used was in the form of sand, and its grains could not be sufficiently cemented. They floated up through the matte and ran with it out of the furnace, bringing about the prompt destruction of a bottom which had been expected to prove extremely durable.

In the summer of 1899 we constructed at the same mine a water-jacketed cupola copper-ore furnace of rectangular form, the hearth of which is 36x120 inches, having fourteen tuyeres of 5-inch clear opening. Its bottom was made of cast iron plates, held up by jackscrews, and protected by a covering 12 inches deep of firebricks. The basic slags, with the matte, would find channels through the firebricks, and thereafter the region of the channels would have to be kept cool by a spray of water until the end of the week, when the time came to renew the bottom. The work had come under the management of James W. Tyson, Jr., who believed he could construct a chrome-ore bottom which would not float in slag or regulus, and would last indefinitely, or, at least, for many months. This paper is intended to recite how he proceeded, and what his results have been.

To contain the chrome ore, and form with it the furnace bottom, he constructed a cast iron basin with surrounding flange, the outer edges of which coincided with the exterior walls of the water jacket. Fig. 1 represents a vertical section, passing through



two of the tuyeres of the water jacket, and through one of the ribs which reinforce the basin. As will be seen, the bottom of the arch is an inverted basin of 36-inch chord and 12-inch versed sine, and 1 inch in thickness (as shown by the dotted line), except the flanges, which are 1½-inch thick. It is in two sections, each of which is 5 feet 7 inches long. Each section is reinforced by three ribs, 1 inch in thickness and depth, as shown in the figure, by means of two of which the sections were bolted together, with an asbestos gasket in the joint. The two outer edges of the basin

were closed by segments, of the form shown by the diagonally-shaded part of the figure, which were cast with the sections. The basin was supported by ten jackscrews (not shown in the figure), placed under its flanges, and thus held securely up against the bottom of the water jackets, leaving free for inspection the entire under side of the basin. The chrome ore was filled into the basin, as shown by diagonal shading in the figure, just filling the basin, and reaching no higher than the bottoms of the four water jackets which form the four walls of the cupola. The ore used was of all sizes, from 10-inch cubes and downward through all dimensions even to dust.

Mr. Tyson says that "the lumps of ore were fitted in as well as possible, the interstices filled with smaller lumps hammered in, and finally the cracks were filled with ground ore." He lays stress on the fact that the ore was well compacted, and that positively no perishable cementing material was employed. Apparently, he lays stress upon having laid a course of firebricks on end over the whole of the chrome-ore hearth, providing a depth of 8 inches of brick to be dissolved before the fused materials could reach it, thus permitting the hearth to heat slowly, and, as he supposes, to "glaze over" before it could in turn be attacked.

The capacity of the furnace is considerably above 150 tons of ore daily; and, with the chrome-ore bottom, it has made a campaign of twenty-three weeks so far. That is to say, it has done well for twenty-three weeks what a firebrick bottom did ill for one week. Its present condition is not known to us, since it has not been seen since the campaign began; and, as "the basin has never been too warm to bear the hand on," we are content to let it continue its good work without interference from us.

Trusting to the continued good character of chromite under the conditions in which it is now serving in the cupola, we are about to erect a blister copper reverberatory, the hearth and adjacent walls of which will be lined with that mineral.

Any adverse criticism relating to the form of the basin herein described, or to the disposition of the chrome ore in it, must be made with a full knowledge of the fact that success—and, probably, eminent success—has attended both constructions. The thing has worked well, beyond any doubt. Nevertheless, I would venture, in the case of another furnace, to alter the construction somewhat, at the risk of making an error. The inner surface of the basin described has a radius of 19.5 inches and a versed sine of 12 inches, affording a space for that depth of ore in the center of the basin. It might be better to make the versed sine 6 inches (which would give a radius of 30 inches for the deeper curve of the basin), and still to lay the chrome ore to a depth of 12 inches in the center of the basin. This construction would give the chrome ore a depth of 6 inches at each side of the basin, and it would reach that distance up into the water jackets. The advisability of this change of construction is almost demonstrable; but this cannot be said for any alteration in the firebrick covering laid over the chrome-ore hearth. What depth of them should be employed, or whether any covering at all is needed, is not now demonstrable. What we do know is that Mr. Tyson laid 8 inches of firebrick over the hearth, and that the latter apparently is as good as it was when the campaign began.

The ore now in the cupola bottom is Turkish, and contains 52% of chromic oxide. There is no apparent reason why 44% ore would not be equally serviceable; and it is more available. Such ores may be had in California and also in the Black Lake region of Quebec.

The chromite cupola bottom above described seems to have suffered no degeneration down to June. It has not been seen by us since the time of its construction, in 1899, because there has been no evidence that any examination was desirable.

Concerning the blister copper furnace mentioned, I desire to say that it was not originally built precisely as above outlined. But later its bridge wall was constructed entirely of chrome ore; and this has suffered no degeneration as yet noticeable. Still later, the slag line of its hearth was built around with chrome ore, and this also has withstood all attacks upon it.

Our experience leads us to believe that the bridge wall of a blister furnace should be lined with blocks of chrome ore, compacted as far as possible, and that the slag line of the furnace hearth should be formed of blocks of chrome ore about 10 inches in height. We would build the larger blocks into the walls, as best we could, and then wedge the smaller ones in among them. The work would appear rude and unskillful when looked upon after completion. Blocks of chrome ore are rough in outline; they do not lend themselves to wall building; and it is a waste of energy to attempt any shaping of them. There is no mortar, wherewith to form an inviting exterior to the work, and there is no other deceitful adjunct present.

But especially at night—when through the charging door one sees the glowing bridge wall as if formed of blocks of snow or piled up white cumulus clouds, and the whitish blocks of chrome ore along the slag line—the structure grows artistic, because beautifully fitting. For no matter what temperature may be attained, or how biting the corrosive and vicious slags may become, yet these chrome ore blocks cannot be

\*Trans. American Inst. Min. Eng., Richmond meeting.



successfully attacked. When the copper has been tapped out of its hearth the furnace may be recharged immediately, while it is hot, and not (as is the case with other linings) after it has grown cold by reason of an interval of three hours, required for repairs.

Writing in "cold blood," and making due allowance for my first enthusiasm, I feel warranted in saying that any copper smelting cupola or blister furnace ought to have a chrome ore lining, as an absolute economic necessity. And I do not see why such a lining would not be the ideal thing for a converter.

### Formulas for Flow of Water in Clean Cast Iron Pipes.\*

I do not pretend to know the history of all the various formulas at present in the possession of the profession, but take it for granted that they are all based on experiments. Experiments to determine the velocity of flow through pipes are beset with many difficulties. In open channels, current meters and floats can be used with very satisfactory results, but this is evidently impossible with pipes, and the only trustworthy method for finding the mean velocity is to measure the discharge and divide it by the area of the pipe. While this may frequently be done with very little trouble in the case of small pipes, the difficulties rapidly augment with the diameters, for obvious reasons. Hence, nearly, if not quite, all of our formulas have been established by observations made on small pipes, and their verification by actual measurement when applied to large diameters is seldom possible. This is unfortunate, because it is precisely for large diameters and heavy deliveries that it is most important to know what can be expected from a given pipe line. Empirical formulas may be safely trusted for values differing but slightly from those for which they have been found to be true; but as the variation increases, the chance of error increases also.

One very serious difficulty attends all such experiments. It is a well-known fact that the nature of the interior surface of a pipe has a very great influence upon the velocity of flow through it. It is hard for any one not familiar with the subject to realize the extent to which this is true. Even those who readily admit the influence which a foul bottom has upon the speed of a vessel going through the water may be unprepared to realize that the same influence obtains when the water goes through the vessel. In the early days of the science of hydraulics water was assumed to be practically a perfect fluid, so that, in passing over the bottom and along the sides of a channel of rough and irregular surface, it would simply level up the irregularities and thus establish an even surface over which to flow. And, indeed, it is probable that this would be to a great extent the fact, were it not for the eddies and counter-currents set up by these irregularities which no doubt exert a retarding influence greater even than that caused by the viscosity of the water. In any experiments, therefore, in order that their results may be applied to practical use, we should know the condition of the interior surface of the pipe experimented upon, and be able to compare it with some fixed standard. It is a common practice to use the term "clean" or "smooth" to indicate such standard of comparison, the standard itself being, however, very vague, though a well-cast pipe thoroughly coated just from the foundry might reasonably be supposed to represent it.

But one important consideration is often lost sight of in this classification. Practically, we are not concerned with a cast iron pipe, but a line of cast-iron pipes. Each pipe may be as clean and smooth as it is possible to turn it out, but there is a joint at every 12 feet, more or less, and innumerable deflections, both horizontal and vertical, from a straight line. If all these changes of direction were accomplished by means of special pipe cast to the proper radius, their effect would be comparatively insignificant; but except in very superior work, or on very pronounced bends, these deflections are overcome by slewing the pipe at the socket for slight variations, and by using cut pipe and sleeves for sharper ones. These causes occasion very serious solutions of continuity in the integrity of the pipe walls, leaving the surface very far from smooth, although it may be perfectly clean. It is this consideration more than any other that gives the deathblow to any possible utility derivable from highly refined pipe formulas. But there are other difficulties which beset the path of the investigator who desires to deduce a general formula from his experimental results, as an illustration will show.

Let us suppose that an experimentalist, whom we will designate as A, has carefully measured the discharge of a line of "clean" 12-inch pipe having a hydraulic grade of 1 per 1000, and from it has deduced the velocity of flow,  $V$ . In the formula,

$$V = C D^x S^y,$$

he now knows  $V$ ,  $D$  and  $S$ , and obviously can vary  $C$ ,  $x$  and  $y$  indefinitely, and quite at will, provided

that each combination gives the correct value of  $V$ .

A second observer, B, has made precisely the same experiment with another "clean" pipe line, same diameter and same slope. He should, of course, get the same value of  $V$ . Equally, of course, and even more so, he does not. He, too, prepares a formula which gives the correct value of his observed velocity, using the same form, but probably a different combination of variables from A. Each observer has a formula which gives with mathematical correctness the velocity of his own pipe line, but would give a wrong result if applied to the other. If, now, a hydraulic engineer, C, wishes to know how many cubic feet per second his proposed 12-inch pipe line will deliver under a fall of 0.001, he can take his choice of either A's or B's formulas, with the almost mathematical certainty that his practical result will differ from both.

But, again, A raises the upper end of his line, so that he now gets a slope of say 5 per 1000, and ascertains, experimentally, the value of  $V$ . He finds that his formula no longer holds good. It evidently is not general, and he must modify it, so that it will embrace both observed results. He can do this by changing all, or any two of the variables,  $C$ ,  $x$ ,  $y$ . This will give him a formula correct for his particular pipe line and for values of  $S$  of 0.001 and 0.005, but not necessarily for intermediate values.

Meanwhile, B has been doing the same with his line, and has also found his formula to be faulty. He modifies it accordingly, but probably differently from A. Here now are two formulas giving not only different values of  $V$ , which is natural, but having also different coefficients and exponents, which is irrational.

Should our two experimenters continue their investigations on other pipe lines, not only of different slopes, but also of different diameters, and progressively change their variables, so as to include each new result, they would continually increase the number of cases for which their formulas held good for their separate pipe lines, and would continually approach each other and the truth, until finally the only significant difference would be in the coefficient  $C$ , which would be the characteristic of their respective lines. I am assuming, of course, that there could be a general formula of the given form. If not only A and B, but the rest of the alphabet also should carry on the same series of experiments not only on so-called clean pipes, but on all the varieties met with in practice, an average value of  $C$  would be found, or rather, and still better, extreme limits would be found between which  $C$  varies with the character of the pipe walls.

Experimental investigation has not yet gone so far as this. Our formulas are based upon a few experiments made on comparatively small diameters, and have been generalized and extended beyond the limits within which observation shows them to be true.

The question then arises, Are there not natural laws which govern the values which can rationally be attributed to  $x$  and  $y$ ? The only influence producing flow in a pipe line is the force of gravity, and the velocity of that flow depends upon the steepness of slope of the hydraulic grade. This velocity must be governed therefore by the law of gravitation, one form of which is  $V = \sqrt{2gh}$ —that is, velocity is proportional to the square root of the height of fall, so that if we quadruple the height, we double the velocity. Are we justified, in view of this fact, in giving any other value to  $y$  than  $\frac{1}{2}$ ? It seems unreasonable to suppose that in rough practice gravity should impart a greater velocity than it does in a laboratory experiment. If there is any difference, one would expect it to be the other way.

Again, it seems to be well established that resistance to flow varies as the square of the velocity, or nearly so. On the other hand, resistance varies as the area of the surfaces in contact, and this varies, in a pipe, as the diameter. Should not the velocity vary, therefore, as the square root of the diameter? In other words, should not  $x$  also equal  $\frac{1}{2}$ ? It certainly appears to me that in a rational formula, based on known natural laws, the velocity of flow should vary as the square roots of  $D$  and  $S$ . If this view is correct, the rational formula would be

$$V = C \sqrt{D S},$$

which is the formula of Chezy, Darcy and others.

It must always be borne in mind by the practical hydraulic engineer that the delivery of water through a "clean" pipe corresponds to the "breaking stress" in a steel girder. No structural engineer would think of using the latter in practice without allowing a large factor of safety. Why should not the hydraulic engineer use the same prudence in his calculations?

### Oregon's First Mining Code.

In 1851 the only mining district known to exist in Oregon was that of the Josephine district. Miners were flocking in from California on the south, and from the Willamette valley and Vancouver on the north. They were congregating at the one gold-bearing locality known—that of Waldo and Althouse, in what is now western Josephine county. There were no existing mining laws in the Oregon Territory code, and accordingly on the first day of April, 1852, on the bank of Canyon creek, a tributary of Rogue

river, forty miners assembled beneath a large fir tree and drafted and adopted the first mining code of the Northwest. The text of the code as adopted read as follows:

Know all men by these presents: That the miners, in council assembled, on this, the first day of April, 1852, do ordain and adopt the following rules and regulations to govern this camp:

Resolved, That 50 cubic yards shall constitute a claim in the bed of the creek, extending to high water on each side.

Resolved, That 40 feet shall constitute a bank or bar claim on the face extending back to the hill or the mountain.

Resolved, That all claims not worked, when workable, after five days, be forfeited or jumpable.

Resolved, That all disputes arising from mining claims shall be settled by arbitration, and the decision shall be final.

Attest:

E. J. NORTHCUTT, Chairman.

### Official Mine History of California.

A large amount of valuable information, particularly relating to the early history of the mines of this State, is buried in the various reports issued by the Federal and State Governments—War Department Reports, Mineral Resources West of the Rocky Mountains, Mint Reports, U. S. Geological Surveys, State Survey and Mineralogist's Reports, Blake's Precious Metals, County Histories, etc.

A card index to this mass of record has been made by Edward Lynch, a mining lawyer of San Francisco. Current newspaper publication concerning the mines not being official or semi-official is only occasionally noted on the cards. The copies of cards following will illustrate the simple system employed in making the index, which has grown to over 10,000 cards and cannot be regarded as complete. The U. S. War Department Reports furnished a number of very interesting and valuable references, though none are noted on the copies below.

The index card on the Empire mine, at Grass Valley, reads as follows:

EMPIRE. Quartz. Gold.

Nevada county. Sec. 35, T. 16 N., R. 8 E., M. D. M.

Ophir Hill, Grass Valley. Located, 1850.

Official survey No. .... Patent date, .....

Raymond's Repts., 1869—p. 26; 1870—pp. 47, 51, 53; 1871—pp. 40, 43; 1873—p. 62; 1874—pp. 117, 128, 129; 1875—pp. 127, 136, 139, 140; 1876—pp. 84, 87, 88.

Mint Repts., 1880—p. 53; 1881—p. 68; 1882—p. 91; 1883—p. 180; 1884—p. 117.

State Mining Bureau Repts., 6th—Part II—p. 46; 8th—p. 426; 10th—p. 371; 11th—p. 272; 12th—189; 13th—242, 252, 270.

U. S. Geo. Survey, 17th Annual Rept., p. 251 et seq.

The index card on the Black Bear mine, in Siskiyou county, reads as follows:

BLACK BEAR. Quartz. Gold.

Siskiyou county. Sec. 13, T. 39 N., R. 12 W., M. D. M.

Black Bear P. O., 8 miles S. of Sawyer's Bar. Located, .....

Official Survey No. .... Patent date, .....

Raymond's Repts., 1875—pp. 165, 166, 167, 168.

Mint Repts., 1880—p. 82; 1881—pp. 100, 102, 103; 1882—p. 125; 1883—pp. 221, 222; 1884—p. 163.

State Mining Bureau Repts., 8th—p. 620; 10th—656; 11th—p. 431; 12th—p. 277; 13th, pp. 389, 434.

### Modern Building Foundations.

The days of the trench digger and the stone mason appear to be passing away. Following the unique concrete piers which have been sunk for the foundations of the new Field building in Chicago, there appears a concrete pile driver, to be used on the foundations of apartment buildings, residences and small stores.

In the old days, when it came to laying the foundation of any ordinary building, shovellers dug deep trenches, and in these the masons set undressed stone, each block in a bed of mortar. This was slow work, but considered sufficient for many, many years. In the modern Field building at Chicago, Ill., workmen dug holes 8 feet in diameter, 90 feet deep. Then in each hole a steel sheath was sunk, and this was filled with grouting. When it hardened it became an everlasting pier. The concrete pile driver works simpler even than this. First workmen skin the ground. The pile driver then is set in motion and bores a hole in the ground to the required depth. The bore is withdrawn and a steel sheath, having a steel core inside of it, is driven by the pile driver to a required depth. Finally the steel core is withdrawn and its place taken with grouting, which, hardening, becomes a permanent foundation.

A foundation of this kind costs a little more than the old style; but the work is done in half the time formerly required, and the permanency secured surpasses that of any ordinary stone foundation ever set. The process is so simple that the wonder must grow as to why use was never made of it before. It saves an immense amount of excavation, upholds a structure by piers of the most permanent kind, and

\* Sherman E. Gould in Engineering News.



prepares the base for use in 50% less time than if stone were used.

The concrete pile is made of taper form and is produced by means of a steel core closely fitted with a shell made of thin steel plate or heavy paper, except wet soil, where it would become moistened, driven in the same manner as wooden piles are forced home in foundation work.

The core is then reduced and withdrawn, leaving the shell in place to maintain the cavity until it is filled with concrete. The pile, however, is not driven to hard pan, as in the case of wooden piles, owing to the friction of the tapered sides against the earth which will hold such an enormous weight that it is unnecessary to go so deep, the taper being calculated according to the character of the soil.

Experiments which have recently been made show that the concrete answers all the requirements of a wooden pile and is less expensive. It was found that at a given blow the penetration of a tapered steel core, 20 feet long, 18 inches in diameter at the butt and 6 inches at the point, was only 1 inch, while that of an oak pile of the same length, 12½ inches at the butt and 10 inches at the point, was 5½ inches.—Cement and Slate.

### No. 2 Universal Milling Machine.

The milling machine herewith illustrated is one of a line of thirteen made by the Kempsmith Mfg. Co. of Milwaukee, Wis., for which Messrs. Parke & Lacy Co. of San Francisco, Cal., are the Pacific coast agents. The manufacturers say that in designing this machine the requirements of tool room and machine shop practice are provided for, and it has ample power, range and variety of spindle and table feeds, with power feed in all directions. The column has a cupboard base with shelves, and the upright spindle bearings are tied together by a bridge cast in one piece with the column. The spindle of forged crucible

### Industrial Combinations Here and Abroad.

The form which industrial combinations take in every country seems to be partly a result of the business habits of the country, partly a result of legislation or lack of legislation.

In practically all places the combinations start by simple agreements among different establishments to sell at a uniform price, or to make no effort to secure the patronage of the customers of one another, or—another manifestation of the same plan—to divide territory among themselves. In most instances, particularly if there are many members of the combination, it will be found that some are not faithfully living up to their agreements, and an effort is then made to secure a firmer union. Wherever the courts will hold an agreement for limiting production or uniform prices legal, the more natural and usual form is for the contracts to be put into writing, with a penalty for breach of contract.

In order to avoid the necessity of litigation it is very common for deposits of securities to be made by each participant of the agreement, with the understanding that if the contract is violated the deposit will be forfeited. If the laws of the country, however, as enforced by the courts, hold such contracts illegal and contrary to public policy, so that they cannot be enforced, the combinations are practically compelled to take some other form, such as that of a single corporation, as in the United States and of late in Great Britain, or else to accomplish the same result in some other way. If the agreement has to do particularly with the regulation of price and is not intended to affect materially the methods of manufacture, it is a common practice in France, in Germany, and in Austria, as well as in other European countries, to organize a selling bureau for all of the establishments, and through the selling bureau, which in itself may be a separate corporation, to determine the extent of the output for each separate establishment and the price that shall be secured for goods. In such cases, of course, the books of the separate members of the combination are open to the selling bureau, and the work of the bureau is open to all of the members, so as to prevent fraud of every kind.

On the continent of Europe it is very generally the case that these combinations regarding prices and output refer only to goods sold within the country, and do not apply to sales for export. It is possible to determine with a reasonable degree of exactness the quantity of goods of any kind that will be consumed at a price remunerative to the combinations within the country itself. That quantity is then fixed and a steady, uniform price for the whole country may practically be established at rates not very oppressive to the consumers, and at the same time profitable to the combination. Any additional spirit of enterprise on the part of any of the members hasto seek its satisfaction in foreign

trade.—From a report by J. W. Jenks, in Cassier's Magazine for October.

### Growth of Railway Traffic.

The growth of railway business in the past ten years, says Bradstreets, is shown by the fact that in the year ending June 30, 1900, the railroads reported that they had carried 1,101,680,238 tons, against 950,763,583 tons in 1899, 897,006,307 tons in 1898, 741,705,946 tons in 1897, 765,891,385 tons in 1896, 696,761,171 tons in 1895 and 638,186,553 tons in 1894, while in 1891 the total tonnage transported was only 675,608,323 tons. Of the total of over 1,101,000,000 tons reported for the year, 957,863,605 tons were classified by commodities, being about 87% of the total. This leaves about 143,816,633 tons unaccounted for as separate commodities. Of the classified tonnage, 546,432,217 tons were reported as originating on the roads which made the reports, while they received 441,431,388 tons from connecting lines. The former figures, increased by a proper proportion of the unclassified tonnage, which would bring the total to about 593,000,000 tons, should, therefore, be accepted as an approximately true measure of the

amount of freight traffic handled by the railroads of the country in 1900-01. Taking, however, the 516,000,000 of tons originating on the reporting roads, the following tabulation exhibits the division of the totals among the different classes of freight:

| Class of Freight.            | Tons.       | Percentage. |
|------------------------------|-------------|-------------|
| Products of agriculture..... | 53,468,496  | 10.35       |
| Products of animals.....     | 14,844,837  | 2.87        |
| Products of mines.....       | 271,602,072 | 52.59       |
| Products of forests.....     | 59,056,421  | 11.61       |
| Manufactures.....            | 69,257,145  | 13.41       |
| Merchandise.....             | 21,974,201  | 4.26        |
| Miscellaneous.....           | 25,239,045  | 4.91        |
| Totals.....                  | 516,432,217 | 100.00      |

The following tabulation presents all the items, amounting to over 10,000,000 tons each:

| Articles.                          | Tonnage originating on roads. |
|------------------------------------|-------------------------------|
| Bituminous coal.....               | 130,443,500                   |
| Anthracite coal.....               | 53,245,195                    |
| Lumber.....                        | 40,977,068                    |
| Ores.....                          | 37,005,530                    |
| Grain.....                         | 28,804,245                    |
| Coke.....                          | 18,917,811                    |
| Sand, stone, etc.....              | 28,445,488                    |
| Merchandise.....                   | 21,972,201                    |
| Iron, pig and bloom.....           | 12,281,361                    |
| Miscellaneous manufactures.....    | 12,583,623                    |
| Miscellaneous forest products..... | 18,678,323                    |
| Cement, brick and lime.....        | 13,429,478                    |
| Bar and sheet metal.....           | 8,144,271                     |
| Live stock.....                    | 8,491,998                     |
| Flour.....                         | 6,088,070                     |
| Castings and machinery.....        | 7,186,880                     |
| Fruits and vegetables.....         | 5,213,210                     |

This confirms the impression as to the preponderance of coal tonnage in the aggregate business of the railroads. Bituminous and anthracite coal, together with coke and ores, amount to over 46% of the total. The actual freight traffic of mineral is, however, a less percentage of the total traffic, the average ton mileage being much less than for other commodities.

### The Jelinek Cage Chairs.

The mechanism of the Jelinek cage chairs is shown in the three accompanying illustrations. Fig. 1 gives



FIG. 1.

a view of the cage bottom with chairs thrown out. It will be noted that springs are not employed in operating the device, but a direct mechanical motion that may be manipulated by a man on the cage, at the landing of any level, at the collar of the shaft, or by the engineer. Fig. 2 shows the position of the chairs after the cage has been landed, the chairs then serving as guide rails and extensions to the track. Fig. 3 is a view of chairs dropping into the shaft as the cage is lifted a few inches before lowering it from a given level. Thus the chairs are thrown out in any one of the four ways designated, but drop inside automatically as the cage is raised above a landing. Old cages may be equipped by ordering new cage bottoms with chairs attached and fitting them in. Hendrie & Bolthoff Manufacturing & Supply Co. of Denver, Colo., state that these chairs are in use at the Iowa mine, near Silverton, Colo., the Golden Cycle at Victor, and the Cook mine at Black Hawk, Colo.



FIG. 2



FIG. 3.

steel is hollow, the front having a B. & S. No. 10 taper hole threaded so that arbors and chucks will interchange with spiral head. The cone pulley has four steps and is strongly back geared. The overhanging arm is provided with a harness to tie it firmly to the knee when heavy cuts are taken. The arm can be removed or turned up out of the way when not in use. The table has quick return of 3 to 1 on same end with slow motion, has three tee slots, an oil pan and channels and can be clamped at any angle. The table swivel block is graduated 50 degrees each way from zero. All movements are indexed to read in thousandths of an inch. The feed is driven by a 1½" belt on five step cones and has twenty changes for every spindle speed, obtained by quick changing self-contained devices. An index plate shows every change from .006" to .126" per revolution of spindle for longitudinal speed. The spiral head can be revolved through an arc of 210°. The spindle of the head is hollow, allowing pieces 1½ inch in diameter to pass clear through. It, as well as the main spindle, has B. & S. No. 10 taper hole. The foot stock has the center placed so that shank or end milling cutters can be used as close to the inner side of center as to the top.

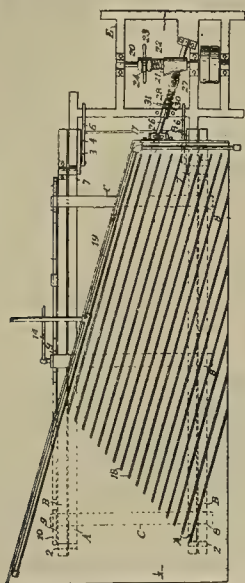


## Mining and Metallurgical Patents.

Patents Issued September 16, 1901.

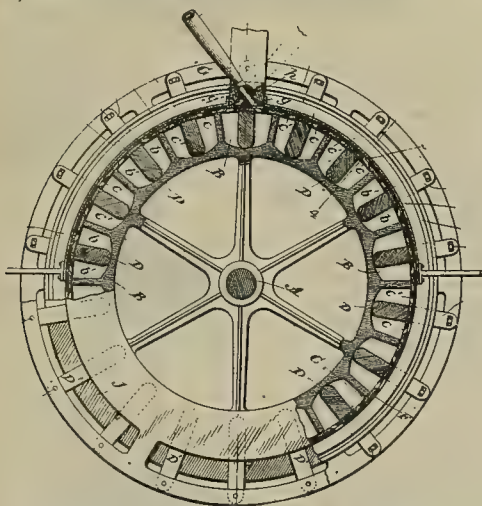
Specially Prepared for the MINING AND SCIENTIFIC PRESS.

ORE CONCENTRATOR.—No. 682,371; H. P. Taylor, Hailey, Idaho.



The object of this invention is to provide a device in which is obtained the widest range of position and movement possible for the concentrating table as may be best adapted to the varying kinds and grades of ores under treatment. It is capable of being given a longitudinal, a transverse and a diagonal tilt at one and the same time, or it may be given any of these tilts singly, or it may remain horizontal, and in any of these positions the movement or length of stroke of the table is capable of variation at will. It consists essentially of a horizontally inclined support, a transversely inclined bed upon this support, means by which these inclines may be varied, a shaking table upon this bed, means by which a movement is given to this table oblique to the horizontal line of the support, means by which the length of this movement or stroke may be regulated, and other details of construction.

WATER WHEEL.—No. 682,979; C. F. Du Bois, Denver, Colo.



The wheel having a series of closed cells or buckets in its periphery and outwardly projecting flanges at each side of cell and projecting beyond, a transverse partition in each cell dividing it into front and rear chambers, partitions having radially projecting arms extending through outer walls of cells and loosely connected to flanges beyond cells; with an annular valve band encircling series of cells having ports adapted to register with inlets to either series of chambers in cells while closing inlets of other series of chambers therein, a fixed block having forwardly and rearwardly inclined ports, and an inlet tube for the propelling fluid connected to block and adapted to admit fluid to either.

ALLOY.—No. 682,330; H. Leyendecker, Cologne-Ehrenfeld, Germany.

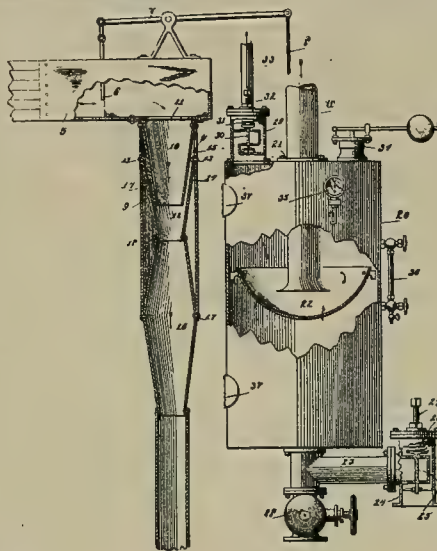
An alloy composed of lead, copper and antimony containing .1% to .5% of copper and .1% to .3% of antimony.

METHOD OF MAKING CYANIDES.—No. 682,311; S. Zuckerschwerdt, Leopoldshall, Germany.

Making cyanides by heating carbon and an alkali in presence of ammonia, impregnating carbon with al-

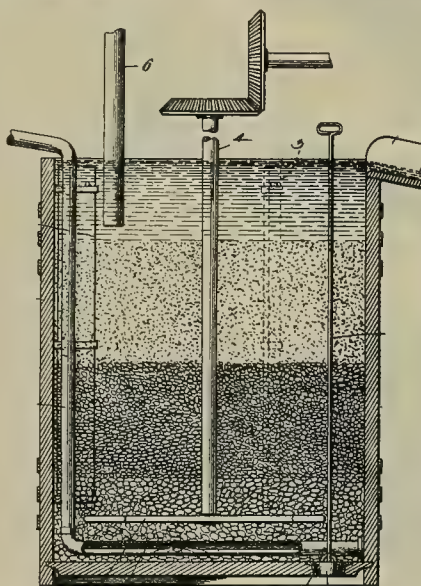
kali by steaming coarsely powdered carbon, then boiling it in a suitable liquid and removing gases, and then saturating carbon so treated with a strong solution of alkali with continuous circulation of latter until all water absorbed by carbon is replaced by alkaline lye.

HYDRAULIC AIR COMPRESSOR.—No. 682,811; J. Paterson, Nelson, Canada.



An external tube, 9, provided with an annular series of air-inlet openings, a tapered water-feed tube, 10, secured in tube 9, another tapered tube, 12, secured at its upper end to tube 9 below the openings therein and arranged to extend below tube 10, tube 12 surrounding tube 10 and forming therewith an annular air space which is in communication with openings, and a double-tapered tube, 16, secured at its bellied portion to tube 9 and at its upper end to tube 12, tube 16 arranged in axial alignment with tubes 9, 10, 12, and adapted to receive, above line of its greatest diameter, contents of tube 12.

METHOD OF LEACHING ORES.—No. 682,612; E. L. Godbe, Salt Lake City, Utah.

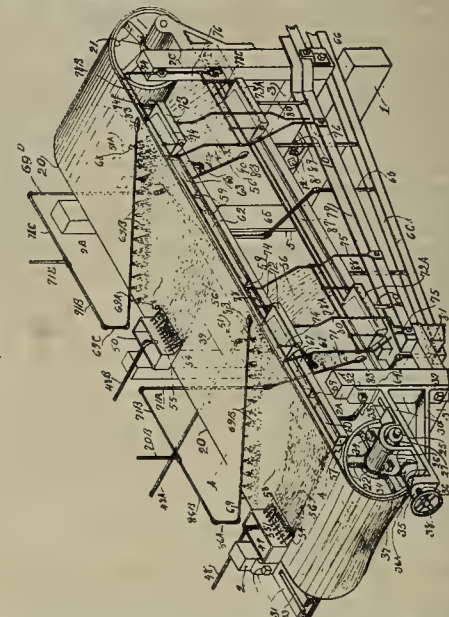


Disposing moistened ore in superimposed strata within a containing receptacle by a continuous mechanical agitation in the lower portion of latter to form a lower thoroughly agitated stratum of heavier portions of ore, a stratum of lighter portions or particles next above which are agitated to a less degree, a stratum of slimes and other lighter portions next above which remain immobile, and a top covering of a clear supernatant solution, introducing ore below upper surface of latter solution, overflowing and carrying off clear solution, introducing a leaching solution at bottom of containing receptacle below lower stratum of heavier portions of ore and causing leaching solution to filtrate or percolate upwardly through strata above and at same time increasing agitation, and carrying off overflow leaching solution and metal in conjunction for precipitation.

PROCESS OF OBTAINING ZINC SOLUTIONS FREE FROM IRON AND MANGANESE COMPOUNDS.—No. 682,794; F. A. Gasch, Honningen-on-the-Rhine, Germany.

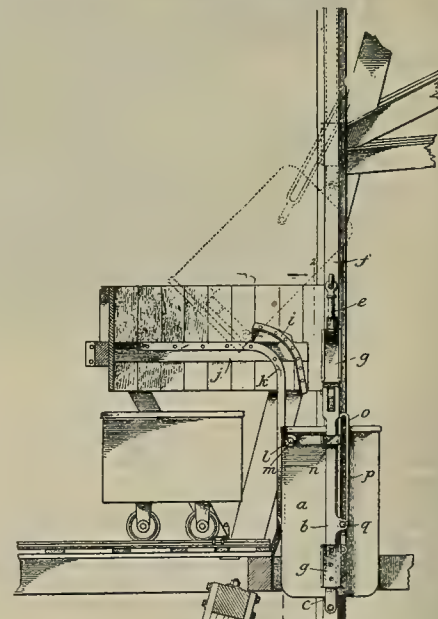
Obtaining zinc solutions free from iron and manganese by treating zinciferous roasted pyrites with concentrated sulphuric acid and roasting product at about a temperature of 400° centigrade, and mixing it while still hot with a suitable oxidizing agent and finally leaching the mixture.

ORE CONCENTRATOR.—No. 682,749; J. G. Roberts, Idaho Springs, Colo.



An endless belt having a concaved, adjustable pulley arranged to support one of its ends and a fixed pulley arranged to support its opposite end, a suitable frame pivotally mounted and arranged and adapted to operatively support belt and its supporting pulleys, means including screws for tilting and adjustably setting frame at any desired transverse inclination to give belt a side or transverse pitch or inclination, means including a screw-controlled pillow block and bearing, and a slotted bracket arranged to support convex pulley for adjustably tightening belt, one or more ore-pulp receiving boxes arranged at higher side of both lower and upper portions of belt, an apron portion on pulp boxes, a series of small pulp discharging holes in boxes above apron arranged to discharge pulp over apron on to belt, means for conveying ore pulp to distributing boxes, a trough arranged along lower side of belt adapted to catch tailings of pulp from belt, a movable adjustable partition in trough arranged to form two or more compartments and to separate and divide pulp into tailings and middlings, a discharge chute below trough, pipes secured to tailings compartments of trough and arranged to discharge into discharge trough, and a pipe leading from each middlings compartment of trough to distributing box of lower portion of belt, and arranged to convey middlings portion of pulp to distributing box, and means including power driven gearing for imparting a slow, longitudinal movement to belt.

DUMPING SKIP.—No. 682,784; T. Bryant, Butte, Mont.



Skip guides provided with recesses, bails provided with shoes secured to and movable on guides, a skip pivoted to bails, shoes rigidly secured to skip and adapted to engage with guides, rollers on skip, tracks adapted to engage rollers when skip shoes are opposite recesses to rotate skip, and links pivoted to skip and engaging with bails to limit rotation of skip.

METHOD OF WELDING METALS.—No. 682,815; B. Purcell, Portageville, Mo.

Sprinkling powdered sulphur into the fire, and subsequently placing the metals in fire and bringing them to a welding heat.



## MINING SUMMARY.

Specially compiled and reported for the  
MINING AND SCIENTIFIC PRESS.

### ALASKA.

#### JUNEAU.

It is stated that the wagon road from Snettisham to the Crystal M. Co.'s property has been completed. This property is operated by F. Cook of Juneau. The mill site is graded and ready for the erection of the mill, which will be commenced soon. R. Semple of Sundum will superintend the construction of the mill. There is a large amount of ore on the mine dump.

The 20-stamp mill of the Alaska-Snettisham G. M. Co. of Snettisham has been started up with full ore bins.

#### VALDEZ.

Sundberg & Miller have brought out \$29,000 from the Chetochena river placers for their season's work. Sundberg says larger shipments of gold from the country will be made this year. The country, he claims, has been fairly well developed this season and good results have been found in most instances.

### ARIZONA.

#### GILA COUNTY.

J. H. Johns, vice-president of the Globe-Boston C. Co., from Leavenworth, Kan., has been inspecting the company's property (the Mallory mines), near Globe, with Supt. Whipple. The two compartment shafts on the I. X. L. claim, at a depth of 145 feet, encountered a considerable flow of water and a steam hoist will be installed immediately and sinking resumed.

#### MOHAVE COUNTY.

A silver discovery has been made 275 feet down in the shaft, being sunk by the Philadelphia & Arizona M. Co. to get water for the new mill at the Minnesota mine. The vein averages 5 inches in thickness and assays 350 ounces silver to the ton. The work of construction of the new mill at the Minnesota mine is going on rapidly. The old 10-stamp plant has been removed to the Merrimac mine and added to the 10-stamp mill there. There is also a new steam hoist at the Minnesota to replace the small one now in use on the main shaft.

#### YAVAPAI COUNTY.

Another strike of good ore is reported from the Larramore mine, near Jerome, owned by Hooker & McFarland. The ore carries 15% copper and some gold. The main tunnel is in about 50 feet and a winze from it about 50 feet down. Six men are at present working.

The Lenora M. Co., St. Louis people, is putting up a 2-stamp mill at Hardyville. The company has a bond on the Rattan-Ruth mines in San Francisco mining district and will soon start up the mine, which has a big hoisting plant on a shaft 200 feet deep. The ore is claimed to run high in both gold and silver. Supt. Boyle will make a test as soon as the mill is completed.

### CALIFORNIA.

#### AMADOR COUNTY.

S. K. Thornton, Supt. of the Shenandoah mine, near Plymouth, has bought the hoist at the Tracy mine, near Carson, and he is moving it to the Shenandoah. He states that a shaft is down 500 feet and levels run.

The Buena Vista Copper M. & Red. Co. has been incorporated at Jackson, capital \$200,000, to work ninety-five acres situated in Camp Opra mining district, near Milton. Two shafts were sunk thirty years ago—one of 450 feet, the other about 300 feet. It is claimed that good pay ore was encountered and that the mine was closed owing to the low price of copper in those days. The present company has been organized with E. A. Freeman, L. P. Haney, N. W. Mahaffey, H. J. Parkinson and W. H. Willis as directors.

#### BUTTE COUNTY.

The Gold Bank mine at Forbestown has been closed down. V. Stow of San Francisco is president of the company. H. P. Stow, Supt., states that the mine was closed down because practically worked out as far down as opened. Some men will be kept prospecting by sinking the shaft and extending the tunnel. Some of the miners have talked of trying mining "on tribute," and this may be done. About 100 men will be thrown out of employment.

The Bader mine, near Magalia, will be hydraulicked. B. Mowry, manager, says that the new ditch to bring water is now complete and a debris dam completed. The mine has been worked by drifting.

#### CALAVERAS COUNTY.

A strike has been made on the 700-foot level of the Angels mine at Angels Camp of very rich ore in a wide vein. The ore

shoot is believed to be the same that has been mined in the Utica mine at the 1200-foot level. The mine is owned by J. V. Coleman.

At the Duchess mine, above Vallecito, the tunnel is being driven to tap the ore body at a considerable depth. The building of the mill on the mine is going ahead. T. F. Laird is Supt.

The Lamphear mine, near Mokelumne Hill, owned by Harris & West, has been bonded by an Eastern company, and work will be begun at once.

S. V. Ryland has sold to Woods Bros. a half interest in his Goot Ranch mine, near Copperopolis. Copper, gold and silver are found in the mine, and assays are said to run from \$20 to \$80 per ton. The shaft is now down 100 feet, and hoisting works are being built to carry the work down to the 300-foot level. The owners are considering putting up a smelter later on.

#### EL DORADO COUNTY.

The Zantgraf mine will be opened under the management of D. H. Coles. An Eastern company has bonded the property and Mr. Coles takes charge as their representative. The liens on the mine are to be paid.

#### NEVADA COUNTY.

C. Welsenburger and D. Nivens of Nevada City will erect the machinery on the De Noon drift mine at North Bloomfield. A large boiler, two carloads of rails and a hoisting works have been secured and will be removed to the mine. It will take seventy tons of 30-pound steel rails for the tunnel, which has been started and will be about 5000 feet in length. It will be 8x12 feet in dimensions. The shaft, which will strike the tunnel, is down about 30 feet.

G. A. Nihell of Cisco is pushing construction of the quartz mill on the Hartley ledge at Meadow lake and expects to finish up the building this fall. The mill will be about a mile from the old town at Meadow lake. He has put in a pipe line a mile long to run from the lake to furnish power at the mill.

#### PLACER COUNTY.

The Shady Run M. Co. has been incorporated, capital \$250,000, to mine at Shady Run. The incorporators are L. E. Cross, W. G. Wallace, S. N. Cross, J. Jackson, J. Fisher, C. E. Williams and J. Fyfe, all of Stockton.

The Green Emigrant quartz mine, situated 16 miles southwest of Donner P. O., owned by Gowing, Jacobs & Co., has made a shipment, the second, of fourteen tons of selected ore which assayed \$180 a ton.

#### PLUMAS COUNTY.

It is reported that recent work in the New York mine, near Greenville, has developed an 18-foot ledge going \$6 per ton. Shortage of the water supply in the lakes which supply the Jamison mine, at Johnstown, with power has closed the mill down. The pump is kept running and the mill will be started again after rain comes.

#### SAN BERNARDINO COUNTY.

The Leland and Mitchell group of mines, near Needles, owned by J. H. West and S. A. Bedell, have been sold to T. Ewing for it is reported \$50,000, a portion of the amount being paid down. S. A. Bedell has been appointed Supt. and will start the mines up at once.

#### SHASTA COUNTY.

The Sybil mine at French Gulch is showing up better, reports the owner, G. A. Von Krusze, who says the ore body has been encountered in the lower drift. The ore from the Sybil is shipped to smelters. Some of it goes over \$200 a ton.

The Salt Creek mine, near Keswick, E. P. Conner, owner, is producing steadily and shipping ore every day to the Keswick smelters. Late returns from the shipments show gradually increasing values.

L. Vaughn of Atwater, Merced county, and a Mr. Davis of the same place intend to do development work on a copper claim with a heavy gossan capping, which is on Pitt river below Kosk creek. Mr. Vaughn will be superintendent.

General Manager Cohen of the Bully Hill copper mine at De Lamar has laid off fifty men at the Winthrop mine, near Copper City, which the Bully Hill Co. has been working. The cost of getting the ore to the smelter has been between \$2 and \$3 a ton, which was considered excessive.

The Behr G. & M. Co. has been incorporated, capital \$100,000, to operate the Berr mine in Old Diggings. G. Behr is superintendent, vice J. J. Lawrence, resigned.

A new mining district may be established in the Enchanted Lake region, near the line between Trinity and Shasta counties, west of Sims station. E. Holden of Redding claims to have discovered a ledge of asbestos, and H. White of Delta says that he has discovered extensive iron and gossan cappings in that region. Mr.

White's discovery is but 4 miles from the railroad.

#### SIERRA COUNTY.

R. J. Sharkey, of Sierraville, has interested parties in the Sierra and Nevada quartz claims, at Sierra City. There is a tunnel already in 500 feet which it is intended to continue to the main ledge.

#### SISKIYOU COUNTY.

The Red Lead quartz mine, a new prospect located by J. McGrew and W. H. Cody at Summerville, is making an excellent showing. The owners have a tunnel 110 feet in on the ledge, which is about 3 feet in width and assays from \$25 to \$35 per ton, free milling.

S. A. Conzetti is digging a ditch to get a larger amount of water higher up on his Junction mine, near Cecilville, which will permit operation three months longer every year.

G. Loud, recently from Colorado, has been appointed foreman at the O. & C. mine, near Sawyers. The grading for the new mill is completed. A mile of road from the mill site to the mine is under construction. Mr. Tyrer, the Supt., is also part owner.

W. J. Balfrey, Supt. of the Salmon River Co. at Summerville, says that the company proposes to extend the telephone line from Cecilville to Summerville and to make connections with their other mines near Sawyers Bar. It is probable that the line will be built up to the Cooper mine and later on to the Lawrence and Yellow Rose of Texas mines on Coffee creek in Trinity county.

Work has been started again in the Wolverine quartz mine, near Hornbrook, and a new mill is to be put up. This mine is owned by an Eastern company.

#### TRINITY COUNTY.

O'Keefe & Co., owners of the Fair View quartz mine, near Minersville, have bonded it to J. Porter for the Altoona Quicksilver Co. at \$60,000. The company will prospect and develop the mine and, if satisfactory, the arrastra will be replaced by a stamp mill.

A. Davis of Yreka and Nelson Bros. of Gazelle have located a copper ledge near Trinity Center. The outcrop is 12 feet wide and is easily traceable for 1½ mile. A sample of the ledge assayed \$56 in copper to the ton.

#### TUOLUMNE COUNTY.

The Jumper mine, near Quartz Mountain, is temporarily closed down on account of shortage of water. It is the intention to make repairs and retimber the New Era shaft during the suspension.

The Blue Slate M. & M. Co., recently organized, is operating four claims near Nashton. A crosscut tunnel has been driven through the Pearl and Last Chance veins to the Rising Sun vein. Drifts will be run on the veins and when ore is in sight the company proposes to build a mill. J. R. Ryland of Los Gatos is president of the company, M. Tait vice-president and general manager, J. E. McGlew of San Francisco secretary, and Commercial Bank of Los Gatos treasurer.

At the Densmore mine, Columbia, the mill has been repaired and work resumed with twenty men under Supt. Thorns. The mine is opened by two tunnels, each in 800 feet. The property is owned by Hayward & Lane.

At the Joe Hooker Co. mine, near Soulsbyville, a boiler and pump have been installed to handle the water. The shaft is now down 55 feet. Eight men are at work, with E. A. DeHaven as Supt. The property is bonded to Los Angeles people by P. B. Bacon.

At the Keltz mine, Sonora, ten men are working under Supt. C. Knox. The ditch is being cleaned out and the mine put in shape to commence operations. The mine is worked through tunnels and owned by the Leachman Prospecting Co., P. L. Dunn manager.

W. A. Nevills has become sole owner of the Rawhide and App gold mines in Tuolumne county, buying the stock interest of his former partners, J. Ballard and W. H. Morton, on the basis of \$1,500,000.

Work has been started on the Garibaldi, on Bull creek, near Groveland, and the mine cleared of water.

#### YUBA COUNTY.

The California G. & C. Co.'s mine, near Spenceville, in which C. C. Bitner is interested, has been bonded to Idaho people, who are working the mine. Mr. Bitner is president and general manager, M. H. Jackson secretary and T. H. Thomas treasurer.

#### COLORADO.

#### CHAFFEE COUNTY.

The Tasmania C. M. & M. Co. owns between 400 and 500 acres of ground near Winfield. This company is at present driving tunnels in several claims and taking out some high-grade copper, lead and silver ore. The Tasmania Co. has a 30-ton pyritic smelting plant, which it anticipates increasing in capacity by eighty tons.

#### CLEAR CREEK COUNTY.

The Lamartine mine is claimed to be producing about \$10,000 a month from development work. It is owned by F. E. Himrod of New York. An electric railroad is projected to be built to the mine when sufficient development work is done.

A strike has been made at Georgetown, in the Burleigh tunnel on the Seven-Thirty vein, at a depth of 1400 feet from the surface, a large body of high-grade ore being opened at the point of intersection, 2700 feet from the tunnel entrance. It is understood that the streak of solid ore is several inches wide and will carry about 300 ounces silver per ton. There is 1000 feet of virgin and undeveloped ground above, and a similar streak of high-grade ore has been mined from the 400-foot level to the surface, the ore chute opened there being several hundred feet long.

#### PITKIN COUNTY.

(Special Correspondence).—The Mollie Gibson and Argentum-Juniata concentrating mills are operating under W. J. Cox as manager, with A. G. McClymonds in direct charge. The Mollie Gibson handles about ninety-five tons of ore per day, the Argentum-Juniata running about 115 tons daily. Both mills, which are under the same roof, operate with crushers, Huntington grinders, classifiers and Frue vanners, there being no jigs. The Argentum-Juniata produces almost strictly a silver ore, that from the Mollie Gibson being silver-lead. The gangue of both ores consists of lime and baryta, with little silica. In some of the ores the baryta carries some silver, in others it is nearly valueless. In the Mollie Gibson ores the lead carries most of the silver and the barren spar is eliminated as nearly as possible by the concentration. The Argentum-Juniata ores carry a larger percentage of lime than is found in those of Mollie Gibson, but less spar. In this case the lime is concentrated out as fully as possible, and the spar, which is in combination with silver, is retained. Neither Argentum-Juniata nor Mollie Gibson ores are lime ores in the sense that the ores are that come from Aspen mountain, on the opposite side of the river. The lime in the former does not exceed 7% or 8%, which is not taken into account by the smelters; but those from Aspen mountain that run high in lime command a premium at the smelters on that account. Mollie Gibson mill concentrates about seven tons to one ton. Both mill forces are made up of three eight-hour shifts.

Aspen, Sept. 12.

#### SAGUACHE COUNTY.

The Philadelphia owners of the Independence mine at Crestone, it is reported, have decided to sink a three-compartment shaft 800 feet, with levels along the vein at every 100-foot station.

#### SAN JUAN COUNTY.

(Special Correspondence).—There is more than the usual degree of activity on Sultan mountain. The town of Silverton is located on a flat at the northern base of this mountain. The principal mine here is that of the Hercules M. Co., a close corporation, Manager T. H. Kane being one of the owners. The mine is opened and developed through three tunnels that crosscut four veins. The Empire, which is the lowest, goes in 2400 feet. The Boston, 275 feet higher than the Empire, cuts 1800 feet in the same direction. The highest is 475 feet above the Boston and goes in 900 feet. All the tunnels are 7x8 feet and are all connected. There are 5700 feet of drifting on the strike of the various veins. It is estimated that the veins are an average width of 2½ feet. The work is done by air drills, operated by a Rand compressor. The ore is a lead, iron and copper sulphide, carrying gold, silver and lead values. It is delivered to the concentrating mill by short surface tram lines. The mill is operated by water power, has thirty stamps, jigs, plates, and Wilfley tables. About 110 tons of ore are milled daily, that tonnage being reduced to about thirty tons of jig and table concentrate. The jigs make a heavy lead product and another grade that carries most of the iron and copper. The jig tailings are elevated and fed to the stamps, the material passing over the plates, thence to the tables.

Joining the Hercules on the south is Champion No. 1, also on Sultan mountain. A 175-foot crosscut tunnel opened a vein, 36 inches wide, of solid copper sulphide, running \$75 to \$100 per ton in silver, gold and copper. Drifting on the vein is going on and some shipments are being made to the Kendrick smelter.

Adjoining this group on the south is Champion No. 2, belonging to the Nodaway Co., whose work has uncovered the same kind of ore.

Lying just north of the Hercules is the old North Star of Sultan mountain, which is not the same North Star as is mentioned in previous correspondence as being located on King Solomon mountain. Through the efforts of Thos. Keely of



Denver all the old interests were acquired by a new company composed of Chicago parties, who intend to put the mine in proper condition and resume operations. Their superintendent, H. Starkweather, is on the ground to carry forward the work.

Silverton, Sept. 7.

#### SAN MIGUEL COUNTY.

(Special Correspondence).—The Carribeau, at Ophir, is mining and milling about twenty-five tons of ore per day. The product is an iron and lead concentrate that carries gold, silver and lead values.

The San Bernardo M. Co. of Colorado Springs and Cripple Creek are operating their mine which is on the San Bernardo spur of Mt. Wilson. The work is under the management of W. D. Blackmer. The mine is opened through a series of tunnels that go in on the vein. The ores carry silver, gold and lead. The property includes a mill which is operating with crusher, rolls, jigs and tables. It operates on about fifty tons of ore per day. Some of the higher grades are shipped direct.

San Bernardo, Sept. 2.

(Special Correspondence).—The Andrus group of three claims, located in Ingram basin, belonging to Geo. Rohwer and others, has been bonded to the Four Metals Co., of which J. H. Shockley is manager. It is understood the latter will do \$1000 worth of work per month on the group from now on. This basin is about 3000 feet higher in elevation than Pandora, and is mineralized by several parallel veins that carry a lead and copper sulphide ore. Besides developing underground the company will erect some necessary buildings. A considerable amount of other work is being done in this basin, where eighteen claims have been patented this season. One car of ore was shipped from the Black Bear group recently.

Telluride, Sept. 13.

#### SUMMIT COUNTY.

On Little Mountain, at Breckenridge, J. B. Conrad and R. W. Foote are doing development work, sinking on the eastern slope of the hill. Later on a drift will be driven to the vein, from which, near the surface, they have made several shipments of a high-grade silver and gold ore that also ran well in lead.

During the recent development work on the Jessie mine, in Gold Run, under both company management and on the Whitehead lease, between 2000 and 3000 tons of mill ore has been accumulated, which will be run through the mill under company operation. The underground work is in charge of H. Whitehead.

The construction of the new plant of the Robinson Con. M. & S. Co. is well under way. This company has bought the old Robinson mine and smelter, at Robinson, to treat the low-grade ores left in the old works in the mine, which could not be profitably taken out and transported to Leadville or Denver. Three furnaces are being installed, with a total capacity of 300 tons. The stack will be 150 feet high, with a flue chamber of 100 feet. The old smelting works will be used for ore bins, while the building enclosing the smelter proper will be entirely new, the boiler and engine room being 150x70 feet and the furnace room 85x116 feet. The carpenter and brick work is in charge of J. L. & L. W. Murphey, who built the Home pyritic plant at Ouray. Brick yards have been established at Robinson; 150,000 bricks have already been burned and 100,000 more are ready for the kiln. The smelter will be connected with the Rio Grande road, the rails passing completely through the plant, so that ore and fuel can be handled with the greatest economy.

#### TELLER COUNTY.

"I believe the average royalty should not be over 10%," says a large owner of Cripple Creek claims. "In some cases 15%, with the maximum not over 25%. These lower rates of royalty should induce many lessees to take up outside ground and work it for a period of from two to five years. Two years ought to be given on every lease, and five on the hard propositions outside the producing area. It has been practically demonstrated that the work cannot be done at a profit to the lessee under the present terms. There is scarcely a company in the district that is making over 25% or 30% royalty—that is, paying over that amount in dividends. Some of the best producers in Cripple Creek pay about 25%, 30%, 18% and 20% dividends. Royalty terms should be pounded down generally to an average of 10%, in order to give the lessee an incentive to put his money into outside development and investments, and the camp will benefit more by that than by any other method in encouraging the small operator. If a good body of ore is opened by the lessee, it will not be a very good property in any event if it plays out before the company gets a chance at it on

its own account. The result of reducing the royalty and increasing the period of time given to the lessee to work, will be of untold advantage to the camp in widening the productive area and opening up new fields. Leasing has always flourished in the district on account of the excellent chances of opening up a very rich deposit that will make a fortune for the miner who is putting every available cent of his own money into the proposition."

The capacity of the mill now being erected by the Portland G. M. Co. will, it is said, be doubled as soon as the machinery is finished and tested. The capacity of the mill now under way will be 300 tons of ore per day, and when doubled will be 600 tons of ore, nearly 19,000 tons monthly. The Portland mine production for September will, it is stated, be close to 9000 tons of ore of all grades.

Big shafts and prospect holes to the number of 100 or more on the properties of W. S. Stratton, in Cripple Creek district, are being filled up with mine refuse and wash. Many finely timbered shafts are being filled the same as the smaller ones. The old shaft houses and machinery will also go, and soon portions of the hills, aside from some of the dumps, will assume the appearance they had before the prospector's appearance. One purpose of the work is to prevent the possibility of entrance to many of the big properties, which are in the course of extensive development at great depth. Stratton's property on the surface extends from Independence to Cripple Creek. The same condition also applies in a measure to his long underground workings. Entering one property, several may be walked through for a mile or farther in several localities, and these distances are being steadily increased. With the numerous and unguarded old openings it would be possible to enter unobserved, commit mischief or theft and escape with the least possibility of detection. There is some ore in a few of Stratton's mines the pounds of which are valued in dollars. Great shafts are being sunk by Stratton on the American Eagles, John A. Logan, Hidden Treasure, Plymouth Rock and other properties that include several full claims, and at extreme depth long drifts are opening the veins. Three years, it is calculated, will have been occupied in the development of Stratton's acreage before it is ready for exploitation.

The Doctor-Jack Pot water column pipe installed in the mine is 10 inches in diameter and is the largest one in Cripple Creek district. The pump is intended to lift 2000 gallons of water per minute and a larger amount if necessary. The flow is now 1800 gallons. It is expected that the work of pumping out the lower levels will be completed before the end of the month.

The pumps have been pulled from the lower workings of the Eclipse Con. mine at Victor and the water allowed to rise while outside improvements are being made. The property is equipped with machinery not considered adequate for the underground work soon to be undertaken. The additional equipment will consist of three boilers and a compressor capable of driving six machine drills. The shaft now down 400 feet will be sunk 600 feet.

Symes, Delaney & Sims are developing a shoot in the Atlanta at Cripple Creek, which they followed in from the Deadwood No. 3 on the 250-foot level. The shoot measures from 14 to 24 inches in width and a return from the initial shipment showed values of \$33 in gold to the ton, without sorting.

#### IDAHO.

##### ADA COUNTY.

W. A. Magee of Pittsburg, Pa., is preparing to put up a 10-stamp mill on the Delhi mine, on Shaw's mountain, 8½ miles from Boise. He has been developing the mine for two years.

##### BLAINE COUNTY.

The new 1100-foot wire cable of the Tip-top mine, near Hailey, has been put in place in the shaft, and sinking will be resumed toward a depth of 1000 feet. The latest development is a body of ore on the 700-foot level that is 14 feet in width and assays very high in gold.

##### ELMORE COUNTY.

F. J. Conroy, manager of the Monarch, Buffalo and Last Chance mines, at Atlanta, states that the shaft on the Monarch mine is now undergoing repairs, and the water is being pumped out, so as to work the Monarch, Last Chance, Pomeroy and Buffalo mines through it. The tunnels leading to the shaft are being cleaned out and bodies of ore in sight will be taken out and milled.—The Big Lode mill, under the management of C. F. Lange, is being rebuilt. The old concentrators have been taken out and replaced by 6-foot vaners, which will have a capacity of handling sixty tons daily.

C. W. Purcell of Washington, O., says of his company's placer ground on the

south fork of the Boise river that the drilling machine installed for the purpose of finding the old channel of the river has been operating steadily on their ground, but has not yet discovered the pay channel. He says that operations will continue all this year at least.

The Golden Age Co. has made the first payment on the Tahoma property, at Atlanta, and F. Willis, as superintendent, has taken charge. It is believed that the mill will be enlarged and twenty additional stamps put in.

#### IDAHO COUNTY.

F. Brown, superintendent of the Jumbo mine, at Buffalo Hump, reports the second run of fifty-five tons of ore as yielding on the plates \$1380, or \$25 a ton. The ore concentrates twenty tons into one, showing a value in concentrates of \$325 per ton, or from the ore of \$16 a ton. The Jumbo vein runs from 4 to 16 feet in width. They are now impounding the tailings.

#### LEMHI COUNTY.

A strike has been made on the Golden Gate mine, on Wallace creek, near Salmon City. The mine was located upon rich gold quartz float, of which about 100 tons have been collected, showing coarse gold in nuggets often as large as grains of wheat. In a 60-foot tunnel, with 40 feet of depth, running through granite, the miners broke into a fine shoot of ore, showing coarse gold similar to the float.

#### OWYHEE COUNTY.

On the Banner mine at Silver City in drifting on the 8-foot ledge good ore has been found. The Banner is the central one of a group of claims on two parallel veins.

#### MICHIGAN.

##### HOUGHTON COUNTY.

The Mohawk M. Co., it is stated, has arranged with M. Guggenheim's Sons to construct a special smelter for the reduction of the mohawkite ore. The smelter is being constructed at Hackensack Meadows, N. J., and the arsenic will be recovered by passing the fumes through a series of vaulted brick chambers, on the walls of which the arsenic trioxide will crystallize, and from which it will be scraped by workmen wearing respiratory masks. The contract made is for three years from the completion of the smelter, calling for the supply of a minimum of 100 tons of mohawkite monthly. The smelter is to treat about seven tons daily. Several hundred tons of the mineral are now barreled at the mine, awaiting the completion of the smelter, which should be in operation in September. The smelting people have agreed to save the copper and a reasonable percentage of the arsenic contained in the mohawkite ore. The silver can also be parted from the copper by electrolytic treatment, but the antimony and cobalt are figured as wasted. Whether the nickel will be saved or not depends upon the percentage of that metal and the difficulties met with in separating it from the numerous other elements in the ore. The value of the copper contained in the mohawkite is very nearly \$200 per ton on the average.

#### MONTANA.

##### FERGUS COUNTY.

A. Hibbard, of Maiden, says the stamp mill belonging to the Missouri Peak G. M. Co. is in operation at Landusky, and that Lortman & Putnam's cyanide plant is being constructed on the southeast side of the Little Rockies, but otherwise there is little doing in the district.

On the Abbey mine, North Moccasin district, which has been bonded by J. R. Cook, of Spokane, who is superintending, the ground is being developed and ore has been found in both the tunnel and the shaft. Ten men are employed.

##### JEFFERSON COUNTY.

The Peck-Montana mill, between Helena and East Helena, is to treat tailings from the Old Comet mill, about 6 miles northwest of Boulder. Wagon haulage to the railroad was found too expensive, and the original cost of a steam tramway was too great. The operation is by the Helena & Livingston S. & Red. Co., and they are using a road engine which hauls three large ore wagons with a capacity of sixteen tons each. The train makes two trips a day, transporting about 100 tons per day. The engine, which was brought from Emigrant Gap, Cal., where it had been used hauling lumber, weighs fifteen tons and has tires 26 inches wide, and the wagons have 10-inch tires. The tailings are loaded into the wagon by a 22-ton steam shovel.

##### LEWIS AND CLARKE COUNTY.

F. Farmer and F. Moratt, of Helena, have sold to J. Lindt, of Council Bluffs, Iowa, for \$2000, the Elizabeth mining claim, in the Scratch Gravel (unorganized) district.

A hoist is being erected by O. A. Southmayd, of Helena, W. B. George and other Billings people on the Levi Blossom mine,

near Helena, and is expected to be in operation soon. The shaft will be sunk to the 200-foot level and a pump will be installed. The mine produced much ore of good value many years ago.

The 10-stamp mill on the Orphan Boy mine, near Winston, has been sold by Wood & Esler to the D. & C. M. Co., which has removed it to its mine on Dry gulch, near Helena, and has it in operation. A shaft is down 103 feet on the lead and sinking continues. The ore milled yields good values and the lead improves with depth.

#### MADISON COUNTY.

M. B. Davis, manager of the Alder Gulch M. & M. Co., has begun work on the concentrator and cyanide plant for the Bell and Grand Union properties, near Virginia. The building will be 140x40 feet, with a wing 20x20 feet, for the engine and boiler. The cyanide room will be 40x100 feet. The plant will be a 40-ton Huntington concentrator.

#### SILVER BOW COUNTY.

The sliding movement which has been damaging buildings and other property in different parts of Butte for several years has made it necessary to close the Never Sweat mine, the largest of the Anaconda properties. It has been stated that the deep shaft of the mine is 7 inches out of plumb, and the foundation of the engines has been so displaced that it has become unsafe to work the engines. The foundation will have to be rebuilt and the mine will remain closed for some time. Anaconda hill, as well as the hill upon which the city is built, has given frequent evidence of the movement of the earth, but the movement has been slight and gradual.

#### NEVADA.

##### ELKO COUNTY.

W. D. Higginbotham, manager of the White Rocks Co.'s placers out of Elko, says he is now putting in flumes, and with the plant equipment completed he expects to begin the washing of gravel before winter.

It is reported that below the 250-foot level at the Dexter M. Co.'s mine at Tuscarora, ore has been found which yields over \$600 per ton in gold and silver.

#### LINCOLN COUNTY.

J. Healey, general manager of the April Fool of De Lamar, discussing De Lamar and its mines, says that since the reduction of the forces at the De Lamar mine the camp has become short of miners. While preparing to install Chilean crushers and remodel the plant according to plans made by Cohen & Janney, there are about fifty miners employed at the De Lamar mine. With the alterations on the mill completed, it is understood that the leaching of a large amount of surface ore carrying about \$5 in gold is to be treated in connection with the output from the Hog Pen shoot. At the April Fool the sulphides have been struck at a depth of 1300 feet, the ore showing a very satisfactory average.

At the Magnolia a few men are cleaning up and preparing for work.

J. A. Miner of Salt Lake City, who lately visited Tonopah with J. F. Anderson and J. H. Jenkins of Philadelphia and of the Tonopah M. Co., in speaking of his visit, states that at Tonopah, within an area of 2000 feet square, are fifteen well-defined ledges, 6 inches to 10 feet in width, with ore being taken out. The average assay value of all ore shipped to date he states as over \$200 per ton. Ore to the gross value of \$216,000 had been shipped from Feb. 16th to Sept. 13th, with 650 tons sacked ready for shipment on Sept. 18th. A 100-stamp mill is to be put in next spring. It is 60 miles to a railroad and twenty-six wagons, drawn by from twelve to twenty animals each, are used to haul the ore, nine tons being a load. The promoters are now working to get a branch railroad to Tonopah next year. To date 114 leases have been let, about seventy-five of which are being worked.

##### NYE COUNTY.

(Special Correspondence).—In a rock drilling contest here to-day Hurley & Saulsbury won, driving the drill through 40½ inches granite in fifteen minutes; Kendall & McAuliffe, second, 35 inches.

Tonopah, Sept. 17.

#### NEW MEXICO.

##### GRANT COUNTY.

The new breaker and switcher being put in by the Colorado Fuel & Iron Co. at Union Hill have been completed, doubling the shipping capacity. Other improvements are projected by the company.

The strike on the El Oro at Hillsboro, owned by W. H. Andrews of Pennsylvania, is said to have the appearance of a placer 300 feet below the surface. The company is sinking 100 feet deeper. The production of the mine is reported in excess of the mill capacity.

A strike has been made in the El Oro



mine at Andrews, operated by the Philadelphia M. & M. Co. On the 300-foot level an ore body, from 2 feet to 16 feet wide, has been opened, assaying from \$8 to \$138 gold per ton. One man is said to be breaking ore sufficient to supply the mill.

## SANTA FE COUNTY.

J. H. Hemler of Cleveland, Ohio, has bought the Lone Star mine, in the Macho district, 14 miles from Santa Fe. The Lone Star belongs to a group of claims owned by F. Malluchet. Mr. Hemler represents Cleveland and Youngstown, Ohio, capitalists. A contract has been let by him for 100 feet of shaft work, and operations will begin immediately.

## TAOS COUNTY.

L. T. Bryan has started work on the Gold Mint mine at Red River, owned by the Gold Mint M. & M. Co. Development work shows a 4-foot vein, assaying up to \$100 in gold per ton.

## VALENCIA COUNTY.

The Zuni Mountain Co. has been incorporated by C. L. Seagraves and W. J. Black of Topeka, Kan.; H. M. Walt of Newton, Kan.; D. B. Burger and W. J. Skeed of Grants, N. M., with capital \$100,000, to engage in mining in the Zuni mountains. The office of the company will be at East Las Vegas.

## OREGON.

## BAKER COUNTY.

P. Campbell of New York, who recently bonded the Flagstaff mine in the Virtue district for \$120,000, has taken up his bond and will soon start work on the property.

The transfer of the Gold Bug and Friday mines from Mahoney & McCarthy to F. Wilson of Salt Lake City, Utah, has also been completed. The price was about \$10,000. Mr. Wilson has placed a 5-stamp mill on the Friday and will push development work. The ore is free milling and runs about \$14 per ton.

## DOUGLAS COUNTY.

E. S. Snelling and A. W. Anthony of Portland and T. Carroll and F. Eidemiller of Tacoma, Wash., have arranged to consolidate the J. S. Savely mine, the High Bench mines and the Goodnough placer mine into one company. The agreement provides for funds sufficient to put in operation five additional plants to the one now in operation. The new company includes G. J. Cole of Farmington, Mo.

## GRANT COUNTY.

The Prairie Diggings quartz mine, near Canyon City, has been sold for \$60,000 to E. J. Foster and W. F. Shaler of Grass Valley, Mich.; M. D. Winder of Spokane and I. B. Hammond of Portland. There are five claims in the group and a water power. The ledge, which is very wide, gives, it is claimed, an average assay of \$8. The ore was run through a 5-stamp mill and produced from \$2500 to \$3000 per month.

The Phoenix mine of two claims, in the Greenhorn district, has been bonded by C. C. Nepple of Baker City at about \$80,000. The ledge has been opened by three tunnels, which are in 700, 300 and 200 feet, respectively, and by two shafts. The ore ledge is from 6 to 7 feet wide and on the lower levels the values are claimed to run from \$70 to \$100 to the ton. A new 20-stamp mill is ordered.

## JACKSON COUNTY.

Returns received from the smelter for a shipment of ore made from the Ray mine, near Gold Hill, show assay values \$49.30 silver and \$7856 gold to the ton. The mine is owned by E. Ray, who took out \$4000 three years ago at a depth of about 150 feet. He leased it to G. H. McDonald and J. Miller of Gold Hill, who continued sinking, and at 175 feet found the rich rock of the shipment mentioned. The lessees also hold an option for its purchase at \$4500.

## SOUTH DAKOTA.

## LAWRENCE COUNTY.

The Hidden Fortune Co. of Denver, Colo., in its shaft near Lead, is getting into a solid ledge of free-milling ore, which assays about \$15 gold per ton.

## UTAH.

## BOX ELDER COUNTY.

The Chester No. 1 and No. 2 mining claims at Park valley have been bought by W. H. Edwards and G. N. Warmick of Salt Lake City, and the former will be in charge of work that is being started.

Supt. Joseph of the West Century, in Park valley, says a strike has been made in that mine. Samples assay \$118 gold, twelve ounces silver and 19.4% lead, the ore coming from a 6-foot quartz ledge.

## SUMMIT COUNTY.

The Bonanza Con. M. Co. of Park City has been incorporated, capital \$150,000. W. H. Dodge is president; J. R. Valentine, vice-president; J. E. Caine, treasurer, and L. B. Hughes, secretary. The com-

pany owns, near Park City, the Silver Lake, Oliver Twist, Silver Bell, Columbia, Little Chief, Key West, Lucy, Triangle, Fraction, Clark, Dodge, Eclipse, Black Hawk Nos. 1 and 2, Liberty and Center claims, and also a bond and lease on the Ivanova.

## WASHINGTON.

## FERRY COUNTY.

The stockholders of the Republic Con. Co., of Republic, have accepted a proposition to issue \$300,000 in first mortgage bonds to secure funds for carrying forward the work. The bonds are secured by first mortgage on all property to the amount of \$300,000, payable in three years, with interest at 6%, the first year's interest being accumulative; that is, not payable except at the company's option until the end of the second year, with the right of the company to pay the bonds off at any time with interest only up to date of payment. Of the bonds \$170,000 is to take up floating indebtedness and \$75,000 is to be applied exclusively to the development of the mine. The remaining \$55,000 is to be kept in the treasury as a reserve fund.

J. Cody, Supt. Flag Staff mine, near Republic, states that he is not working in the shaft which was sunk last year, as no more can be done without installing machinery. He is sinking a new shaft and has opened a fine body of high-grade ore. In the old workings at a depth of 100 feet there was exposed 15 feet of \$15 ore. The ledge was crossed for a distance of 70 feet and no wall reached. The ore outside of the 15 feet mentioned carried values of from \$5 to \$8 per ton. It is expected that before winter sets in the mine will be equipped with machinery and work resumed on the old shaft. The Gold Ledge lies 1 mile south of the Flag Staff. A contract has just been let and work resumed. The face of the tunnel is in 430 feet. The contract calls for its extension 325 feet, which will cut the ledge at a depth of 350 feet.

## PIERCE COUNTY.

The Pacific Smelter Co. has been organized in the State of Washington, to erect a standard blast smelter of 250 tons daily capacity, for handling the products of Darrington mines, 70 miles from Seattle on the Northern Pacific road. It is a comparatively new mining camp, located at the foot of the Cascade range. One mine, called the Forest, is claimed to have a vein 90 feet wide opened to turn out 200 tons of ore daily. There is a 600-foot tunnel, with crosscuts opening stopes. The ore is considered suited for pyritic smelting. Contracts for ore, smelter site, water power and buildings have been let. F. M. Perkins, of Colorado Springs, Colo., is interested in the proposition. A wire tramway will also be erected to convey the ores from the mines to the smelter.

## YAKIMA COUNTY.

G. Welkel and others have located thirteen coal and iron claims in the Cascades, about 50 miles west of North Yakima. A load of the coal has been brought out and tested. It is said to be anthracitic, burning freely without flame or smoke and leaves no cinders. Five veins of coal have been located. They range from 3 feet to 13 feet in thickness. The coal is said to cover large deposits of iron ore.

## WYOMING.

## CARBON COUNTY.

The State Line C. M. Co. has been incorporated to operate in Carbon county, capital \$75,000. Incorporators, J. F. Sampson, C. Ayers and W. W. Wentworth of Grand Encampment.

The Fairview G. M. & M. Co. has been incorporated to operate in Albany and Carbon counties, with office at Laramie; capital \$25,000. Incorporators are W. McGaslin, C. DeKay and A. C. Stead.

The Newman C. M. Co. has been incorporated to operate in Carbon county, with office at Grand Encampment; capital \$1,250,000. Incorporators are C. Sheney, S. Nadney and J. Newton, all of New York.

The Sunnyside G. & C. M. Co. of Kansas City people has let a contract for 100 feet of tunnel work on its mine near Grand Encampment.

It is reported that sampling works will be established at Laramie to buy all the ore offered by miners and sell to Eastern smelters.

It is reported that a consolidation of copper companies is to be made by a company now organizing with capital \$10,000,000, which, it is understood, will buy the Ferris-Haggarty, Kurtz-Chatterton, Rambler, Osceola and Osceola Jr. and Union mines, the Grand Encampment smelter, the Encampment townsite, the Copper State Bank of Encampment, the Pearl townsite in Colorado and several mining properties in the Pearl district. It is also proposed to construct a tramway from the Ferris-Haggarty to the Encampment smelter.

The Vulcan Co. has called for bids to drive a tunnel on its mine near

the Ferris-Haggarty at Encampment. The deepest shaft is down 50 feet.

The Ferris-Haggarty Co. stockholders have received the dividend of 1 cent a share, a total of \$10,000, declared in August.

A find of 3 feet of high-grade sulphides has been made in the tunnel of the Winona-Rex Copper M. Co., 140 feet in, and drifts have been started both ways on the ore body.

## ALBANY COUNTY.

At a meeting of the business men of Laramie, held on the 21st inst., \$87,000 was pledged for a smelter to be built at that point. One man pledged \$65,000, providing it could be shown the mines in the district can furnish enough ore to keep the smelter in operation. A Denver expert is to make an investigation to determine the producing capacity of the mines and, if the report is favorable, work will be started at once.

## FOREIGN.

## BRITISH COLUMBIA.

O. Wethered, president of the London & British Columbia Goldfields Syn.; A. J. Stoneham of London; J. R. Robertson, general manager, and S. S. Fowler, the company's engineer, are inspecting the Granby plant and the company mines at Phoenix and Greenwood. Wethered & Robertson are also officials of the subsidiary company developing 6000 H. P. from the Kettle river at Cascade, and state that the power plant at Cascade will have 3000 H. P. developed before January 1. The power will be transmitted to the various Boundary camps.

The Spruce Creek Con. Placers, Ltd., has been organized in Seattle, capital \$2,500,000, and W. M. Brook of Atlin, general manager. It has bought Captain Martin's interests on Spruce creek at Atlin, the property consisting of an hydraulic bench lease and creek claims near 140 feet below, together with the first water right—2000 inches—granted on Spruce creek. The price paid is stated to be \$35,000. The ground is well opened up.

The Republic and Phoenix groups on Erin mountain, at Slocan, are to be worked on a large scale and will have machinery installed. At the Republic more men will be employed under the superintendency of R. C. Campbell-Johnston. The Slocan-Republic M. & Dev. Co. has been incorporated to operate the Republic mine; capital \$1,500,000.

The last clean-up of the season at the Con. Cariboo hydraulic mine is stated as being about \$35,000. Piping has ceased, owing to the water supply giving out. Excavating for the bedrock flume is being pushed ahead, and it is expected that the flume will be completed this winter so that piping on the bedrock will be begun next spring. There is a strip of bedrock about 2000 feet long carrying from 70 to 80 or 100 feet in depth of gravel that has not been touched. J. B. Hobson is manager.

The Le Roi mine at Rossland has started up and the company is advertising for 700 men, 400 miners at \$3.50 per day and 300 muckers to push cars and shovel at \$2.50 per day. The five-compartment shaft of the mine is down 1150 feet and is under contract to be sunk to the 1500-foot level. The ore bodies are opened up from the surface to the 900-foot level and the output when working will be 1000 tons daily. The new machinery now ready to run is of the most advanced type and the most powerful in British Columbia.

## KLONDIKE.

The total shipments from Dawson since the first of June have amounted to \$18,643,000. The shipments in May, before the law went into effect requiring the issuance of export certificates, would probably make the total \$19,000,000. The final shipments of the season during September will likely not exceed \$1,000,000, making the total for the season about \$20,000,000. The shipments from Dawson do not represent all going from Yukon Territory. The Forty Mile, Big Salmon and other mining recorders' offices in Yukon are also recording shipments through their hands.

## MEXICO.

Dividend No. 2 of \$120,000, 2% on the capital stock of the Greene Con. C. Co., has been declared, payable Sept. 30, making \$220,000 paid this year. This company's railroad from the present railroad terminus to the company's smelters at La Cananea is reported completed half way. Reports from the mines say improvement in the richness and extent of the ore and the smelters are producing from 160,000 to 165,000 pounds of matte, or about 65,000 pounds of copper per day. Improvements and enlargements are being made to the reduction plant, which, when completed, will have 6,000,000 pounds capacity of blister copper per month.

## Personal.

W. A. HUNNEWELL of Butte, Mont., has returned from Nome, Alaska.

O. A. TURNER, manager Tonopah mines, Tonopah, Nev., is in San Francisco.

H. W. TURNER, of San Francisco, is reconnoitering Texas oil fields and Mexican mines.

R. C. GEMMEL of Salt Lake City, Utah, has accepted the management of a large mine in Mexico.

J. B. TREADWELL of San Francisco, Cal., has been examining the asphaltum deposits near Ashland, Or.

F. KLEPETKO of the Amalgamated Copper Co. staff at Butte, Mont., was in Salt Lake City, Utah, during the week.

G. E. LAKE has been appointed manager of the Ermaine G. M. Co., operating the Smoky Hill mine at Wall Street, Colo.

G. L. MILLER, who has been superintending mines at Hunker Creek, in the Yukon, has returned to Vancouver, B. C.

R. J. DAVISON, general manager of the Chairman M. Co., operating at Ely, Nev., has returned there from a month's trip to New York.

N. E. LINSLEY of Spokane, Wash., is examining the North Fork coal mines in Boundary district, B. C., for the Granby smelter people.

O. STALMAN, manager of the Glasgow & Western Ex. Co. mines, in Utah, has returned to Salt Lake City after a year's absence in Europe.

A. J. McMILLAN, managing director of the Snowshoe G. & C. mine at Phoenix, B. C., has returned there after several months absence in London, Eng.

G. E. BAILEY is on a reconnoitering expedition at Daggett and other Southern California points in the interest of the California State Mining Bureau.

A. H. CEDERBERG, of Catasauqua, Pa., constructing engineer of Portland Cement Works, is in San Francisco, looking over the openings for the industry in California.

## Commercial Paragraphs.

THE Weigels Pipe Works, Denver, Colo., are putting pipe lines for water power on Henson creek, Hinsdale county, Colo.

In addition to the lighting and street railway systems and to the small motor circuits about Seattle and Tacoma, Wash., Snoqualmie power is being delivered and used to operate the Centennial Flour Mill and the Capital Flour Mill, in Seattle, and the Tacoma Smelting Co.'s plant, in Tacoma, where the power equipment is electric throughout, comprising a complete installation of Westinghouse motors. This smelter commenced operating by electricity Sept. 1, 1901, the new service replacing three different steam plants about the premises. In the short time that this smelting plant has been operating electrically, the service has been in every way satisfactory.

## Recently Declared Mining Dividends.

|                                                                              | Payable. |
|------------------------------------------------------------------------------|----------|
| Greene Con. Copper Co., Sonora, Mexico, No. 2, 2%, \$120,000.....            | Sept. 30 |
| Amalgamated C. Co., quarterly 1 1/2%.....                                    | Oct. 28  |
| Modoc G. M. Co., Colorado, 3 cents per share, \$15,000.....                  | Oct. 15  |
| Rambler-Cariboo G. M. Co., British Columbia, 1 cent per share, \$12,500..... | Oct. 30  |

## New Patents.

DEWEY, STRONG & Co.'s SCIENTIFIC PRESS PATENT AGENCY, 330 Market St. S. F., has official reports of the following U. S. patents issued to Pacific coast inventors:

FOR WEEK ENDING SEPTEMBER 17, 1901.

|                                                             |  |
|-------------------------------------------------------------|--|
| 682,683—TIMBER DOLLY—J. L. Bayley, Spokane, Wash.           |  |
| 682,902—SPRAY PUMP—J. Bead, Los Gatos, Cal.                 |  |
| 683,010—POWER PLANT—G. A. Bobrick, Los Angeles, Cal.        |  |
| 682,976—CASTER BRAKE—Denzer & Hult, Hood River, Or.         |  |
| 682,614—SAW TEETH—E. E. Harris, Aberdeen, Wash.             |  |
| 682,617—BED COVERS—J. Herbs, Redlands, Cal.                 |  |
| 682,621—ELECTION BOOTH—F. M. Humphrey, Pendleton, Or.       |  |
| 682,622—CAR—F. M. Humphrey, Pendleton, Or.                  |  |
| 682,938—HORSESHOE'S KNIFE—G. C. Ingram, Santa Tacoma, Wash. |  |
| 682,873—HOSE COUPLING—F. D. Joy, Glendora, Cal.             |  |
| 682,940—BOOT HEEL—C. E. Keller, Los Angeles, Cal.           |  |
| 682,944—TURNABLE—T. F. Langley, Corvallis, Or.              |  |
| 682,602—INCUBATOR—J. H. Madison, Petaluma, Cal.             |  |
| 682,735—PACKING CASE—M. McRoberts, S. F.                    |  |
| 682,614—FRUIT CLEANER—F. E. Proud, Orange, Cal.             |  |
| 682,765—STEAM BOILER—Stetson & Thomas, Sausalito, Cal.      |  |
| 682,692—TOOTHPICK—Emma J. Thurston, Deming, Wash.           |  |
| 682,667—OAR LOCK—White & Snyder, Marshfield, Or.            |  |
| 682,658—SOLAR HEATER—J. M. Wishart, Oakland, Cal.           |  |



## Latest Market Reports.

SAN FRANCISCO, Sept. 26, 1901.

**SILVER.**—Per oz., Troy: London, 26½d (standard ounce, 925 fine); New York, bar silver, 58½c (1000 fine); San Francisco, 58½c; Mexican dollars, 47½c San Francisco, 45½c New York.

**COPPER.**—New York: Lake, 1 to 3 casks, \$17.25; carload lots, \$17.00; Electrolytic, 1 to 3 casks, \$16.75; carload lots, \$16.62½; Casting, 1 to 3 casks, \$16.60; carload lots, 16.50. San Francisco: 18. Mill copper plates, 20c; bars, 22@23c. London: £63 18s 9d per ton.

It is stated that there is a large accumulation of copper in stock in the United States, practically all in the hands of the companies controlled by the Amalgamated Copper Co., and in storehouses of the United Metals Selling Co., controlled by the same interests. The net exports are at this writing about 50,000 tons less than in 1900 at the same date. There is a decrease in the visible stock in Europe, but London price continues to drop, the past week the difference amounting to over ½ cent a pound. The claim is made that consumption in the United States has increased to such an extent that it has absorbed the difference in the exports of the two years, but it does not seem to be proven by any figures. Amalgamated Copper Co. stock has dropped sharply, but the movements from day to day suggest manipulation. The reduction of the dividend rate to 6% has undoubtedly contributed to this, along with the strong presumption of accumulating stocks. The situation, summed up from a copper consumer's standpoint, would appear to be that there is that probability that there will be a drop in prices that at present prices there is no inducement to carry stock.

**LEAD.**—New York, \$4.37½; Salt Lake City, \$4.00; St. Louis, \$4.40; San Francisco \$4.90, carload lots; 5½c 1000 to 4000 lbs.; pipe 6, sheet 6½, bar 5½c; pig, \$5.25. London, £12 6s 6d per ton—2.66 cents per lb.

**SPELTER.**—New York, \$4.20; St. Louis, \$3.75; London, £16 2s 6d per ton—3.58½ cts. per lb.; San Francisco, ton lots, 5½c; 100-lb lots, 6c.

**ANTIMONY.**—New York, Cookson's, 10c; Hallett's, 9c; San Francisco, 1000-lb. lots, 10c; 300 to 500 lbs., 11c; 100-lb. lots, 13@15c.

**IRON.**—Pittsburg, Bessemer pig, \$16.00; gray forge, \$14.00; San Francisco, bar, per lb., 2.65c in small quantities.

**STEEL.**—Bessemer billets, Pittsburg, \$24; open hearth billets, \$26.50; San Francisco, bar, 7c to 12c per lb.

**TIN.**—New York, pig, \$27.50; San Francisco, ton lots, 30c; 1000 lbs., 30½c; 500 lbs., 30½c; less, 31c; bar tin, \$3.50.

**QUICKSILVER.**—New York, \$51.00 large lots; London, £9 2s 6d; San Francisco, local, \$47.50 per flask of 76½ lbs.; Export, \$45.00.

**MAGNESIUM.**—New York, \$2.90 per lb.; San Francisco, \$3.75.

**ZINC.**—San Francisco, 5½c; slab, 5½c; bar, 7c; zinc dust, N. Y., 8c.

**BABBITT METAL.**—San Francisco, No. 1, 10c.

**NICKEL.**—New York, 50@60c per lb.

**ALUMINUM.**—New York, No. 1, 99% pure ingots, 35c; No. 2, 90%, 30c to 35c.

**SOLDER.**—Half-and-half, 100-lb. lots, 19c; San Francisco, Plumbers', 100-lb. lots, 15½c.

**PHOSPHORUS.**—F. o. b. New York 50@60c per lb.

**ASSAY LITHARGE.**—San Francisco, 10c per lb. small lots.

**PLATINUM.**—San Francisco, crude, \$19 per oz.; New York, \$20.50 per Troy oz.

**BISMUTH.**—New York, \$3.25, 50-lb lots; San Francisco, \$2.50 to \$2.75 per lb.

**FERRO-MANGANESE.**—Pittsburg, 80%, domestic, \$53.50, large lots.

**TUNGSTEN.**—New York, \$95c; San Francisco, \$1.15.

**FERRO-TUNGSTEN.**—New York, 37%, 32c; San Francisco, 65c (60%).

**POWDER.**—F. o. b. San Francisco: No. 1, 70% nitro-glycerine, per lb., in carload lots, 15½c; less than one ton, 17½c. No. 1\*, 60%, carload lots, 13½c; less than one ton, 15½c. No. 1\*\* 50%, carload lots, 11½c; less than one ton, 13½c. No. 2, 40%, carload lots, 10c; less than one ton, 12c. No. 2\*, 35%, carload lots, 9½c; less than one ton, 11½c. No. 2\*\* 30%, carload lots, 9c; less than one ton, 11c. Black blasting powder in carload lots, minimum car 725 kegs, \$1.50 per keg; less car lots, \$2 per keg.

**CAPS.**—3x, \$5.50 per 1000; 4x, \$6.50; 5x, \$8; Lion, \$9, in lots not less than 1000.

**FUSE.**—Triple tape, \$3.60 per 1000 feet; double tape, \$3.00; single tape, \$2.65; Hemp, \$2.10; Cement No. 2, \$3.00; Cement No. 1, \$2.65, in lots of 3000 feet and up.

**CANDLES.**—Granite 6s, 16 oz., 40s., 9½c per set; 14 oz., 40s., 8½c.

## SITUATIONS WANTED.

An experienced mill man desires position in mill; understands Amalgamation, Concentration and Assaying. Address G. M., this office.

A first-class machinist, engineer and cyanide man wants situation. Ten years experience in cyanide plants; three years foreman; three years superintendent. At reference Box 52, this office.

**WANTED—POSITION AS MINE SURVEYOR** by young man of five years' experience. Technical graduate. Address M., care of Mining and Scientific Press office.

**YOUNG GRADUATE MINING ENGINEER** desires appointment as surveyor, assayer, or assistant to superintendent. Four years' experience in lead, tin, copper and gold mining. Good references. Apply L. T. this office.

**WANTED—SITUATION BY A GOOD AMALGAMATOR, assayer and cyanide man.** Understands mine accounting. Competent to act as manager. Best of references. Address H. J., Mining and Scientific Press office.

A Civil and Mining Engineer (member American Society of Civil Engineers, member American Institute of Mining Engineers), at present general manager of a Western gold mining company, desires change. Will go anywhere. Examining or reporting, exploration work or operating. Address Box 264, Grangeville, Idaho.

**MINING ENGINEER, graduate Mass. Inst. Tech.,** with thirteen years' experience as miner and surveyor for large copper company in Montana; superintendent of coal mine, washer and coke oven plant and railroad in South for six years; in charge of zinc property in Missouri; familiar with concentrating methods; at present in charge of cyanide operations of tailings pile in California, desires position with reliable company. Open for engagement after October 15. Address S. J. M., care Mining and Scientific Press.

There is in Butte, Mont., a young man (32) who has worked in all kinds of metal mines in seven different States for 12 years. He has made a study of mineralogy, geology, surveying and timbering for years, and though he still wears a number 7½ hat, yet thinks he is capable of taking charge of and successfully running a mine. There is no question as to his experience and knowledge, only his executive ability needs demonstration; and he has been "man handled" so long he thinks he is fully capable of doing a little handling on his own account. First-class references. Address "Young Feiler," Box 1182, Butte, Mont.

## PLACER MINERS

having PLATINUM, IRIDIUM and other PLATINUM METALS associated with their gold should save them. They are worth about as much as gold. They cannot be saved by amalgamation. For sale or free analysis, send to the Welsbach Company, Broad and Arch Sts., Philadelphia, Pa. For information as to the method of saving the metals, write to the Waratah Minerals Company, Limited, 140 Ellis St., San Francisco, Cal.

## WANTED.

**WANTED.—A SECOND-HAND 5 OR 10 STAMP** mill, or rolls of same capacity, in good condition. Correspondence solicited. JNO. W. COVER, Hotel Donnelly, Tacoma, Wash.

**WANTED, a graduate of Stanford or Berkeley** (mining and scientific dept.) by a California mine. Must be a good surveyor and assayer, with a thorough technical knowledge of absolute mining. To a good man advances will be rapid, but he must commence at practical work. A man with social standing and refinement preferred. Address "Shasta," care of Mining and Scientific Press.

## WANTED IMMEDIATELY.

## A First-Class, Reliable Carriage Blacksmith.

One thoroughly competent to take charge of a shop. Excellent chance for the right man to better his position, if satisfactory. Answer by letter to P. C. JURS, 1119 Van Ness Ave., San Francisco.

**EXPERIENCED MINING ENGINEER (43)** will leave for Philippines in November. Will accept commissions, and present himself with credentials to reliable parties wishing his services there, after November 1, 1901. Address Supt. M. & M. C. M. & S. Co., Altyn, Montana.

## TO WELL BORERS.

We have six thousand acres of Coal Land to prospect by boring. Who may be interested, communicate with the KNAPPA COAL CO., Astoria, Or.

## FOR SALE.—FOUR WOODBURY IMPERIAL CONCENTRATORS,

USED ONE MONTH. Address H. WHITNEY, Placerville, California.

## FOR SALE.

One Duplex Rix Air Compressor, 20-in. Cyl. by 30-in. Stroke, Driven by Direct Connected 25-ft. Cobb Wheel, 120 H. P.

Will be sold cheap, with or without water wheel. Condition good. Address L. J. HOHL, Cherokee, Butte Co., Cal.

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## IN LOTS TO SUIT.

Write for Quotations.

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**CHAS. E. BILLIN & CO.,**  
CHICAGO, ILL.

Solicit correspondence from parties having for sale complete

**Mining, Milling, Smelting,**  
**OR OTHER PLANTS.**

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We purchased last spring and have dismantled and resold the Diamond Hill mill, 120 stamps, vanners, water power, etc. Montana Gold Mining Co., 6 Huntington mills, power, etc.

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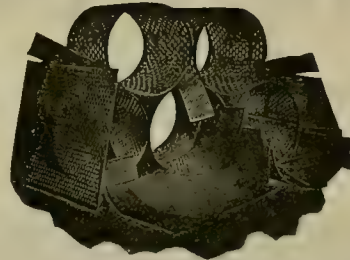


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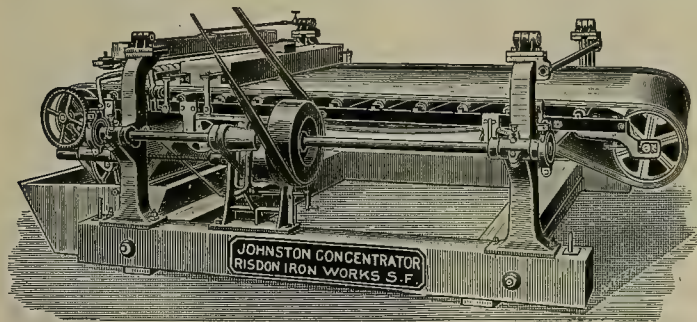


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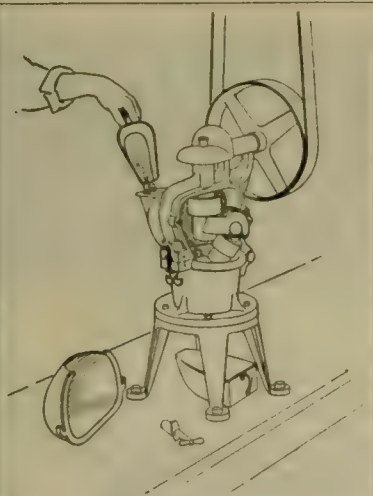
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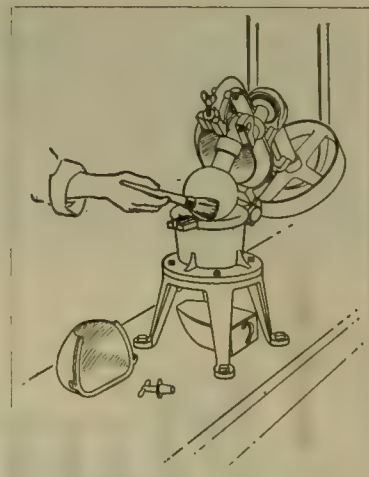


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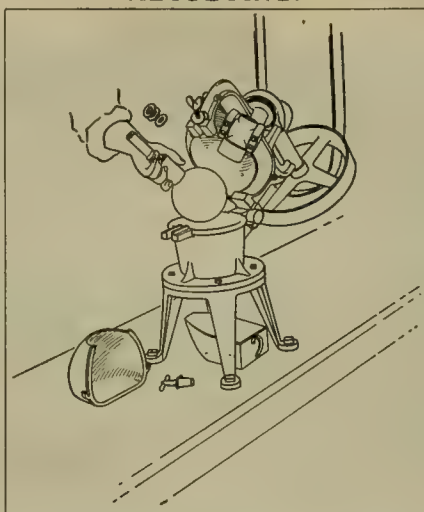
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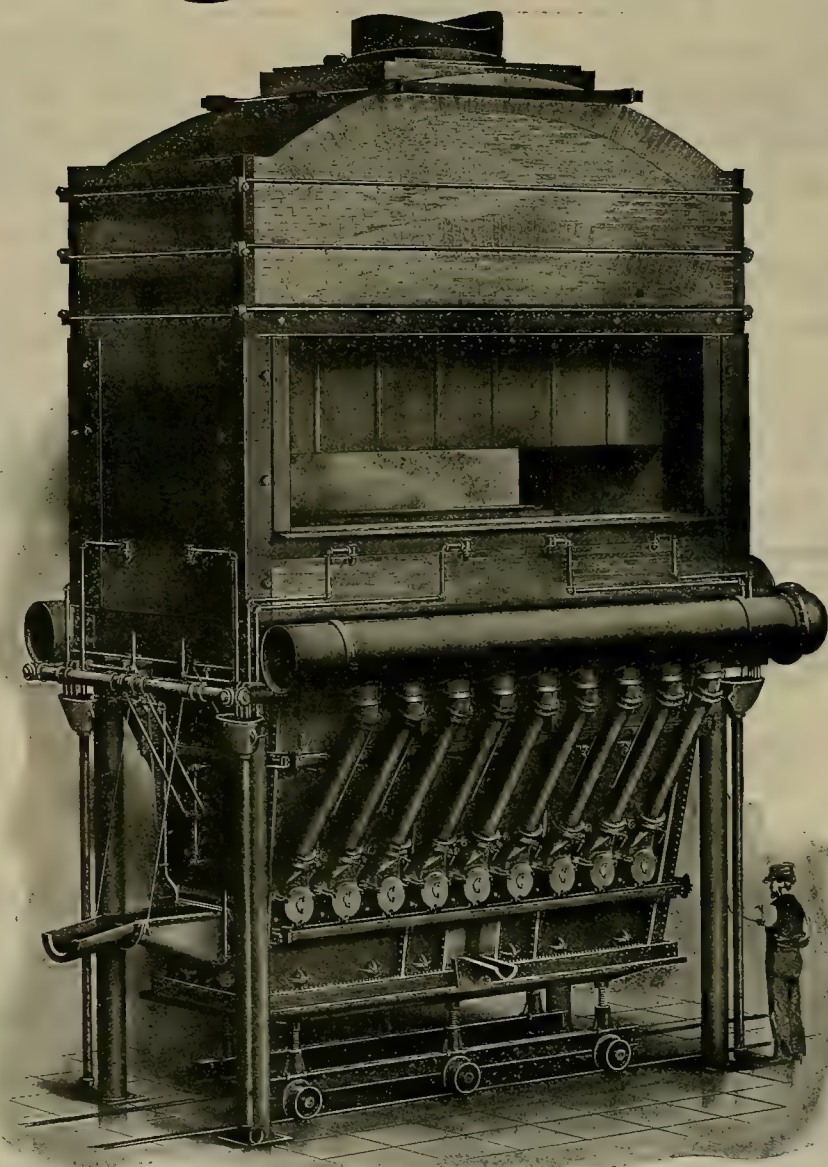
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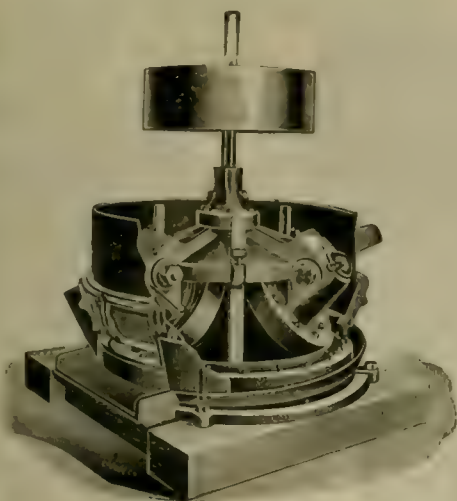
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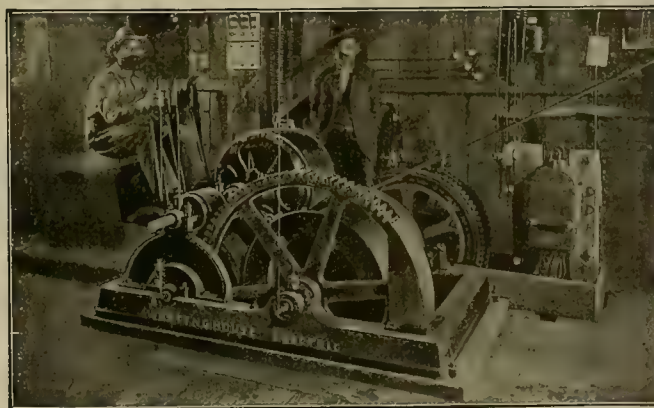
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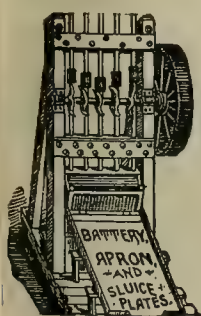
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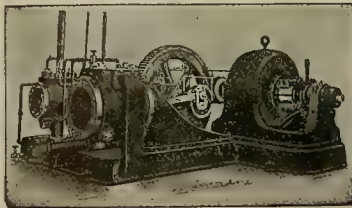
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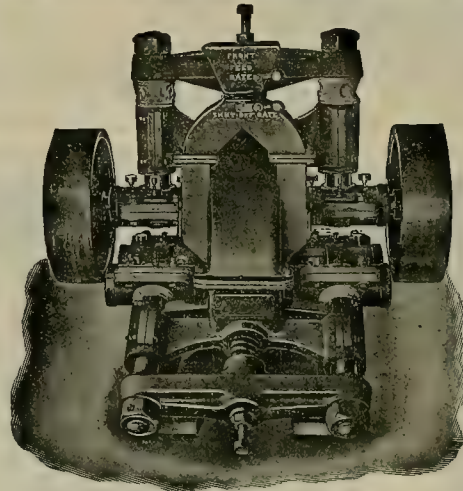
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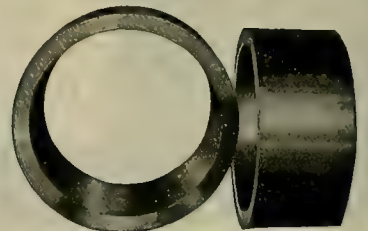


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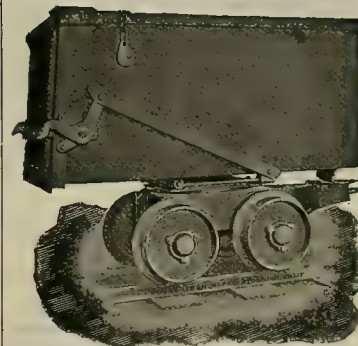
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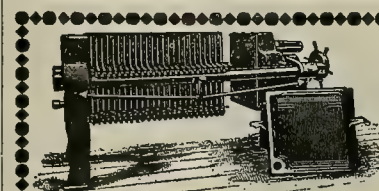
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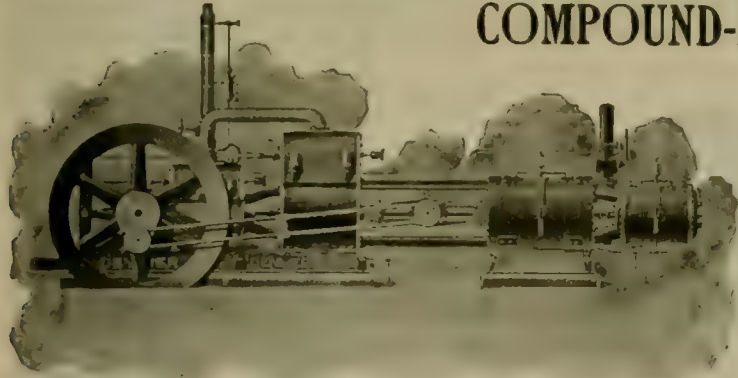
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ESTABLISHED 1870  
Best Quality at Lowest Prices

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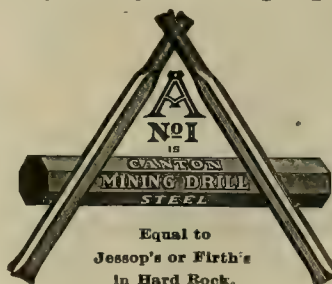
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For DIAMOND DRILLS and all Mechanical Purposes.

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If you require a high grade steel possessing toughness and  
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THEY HAVE NO EQUAL FOR  
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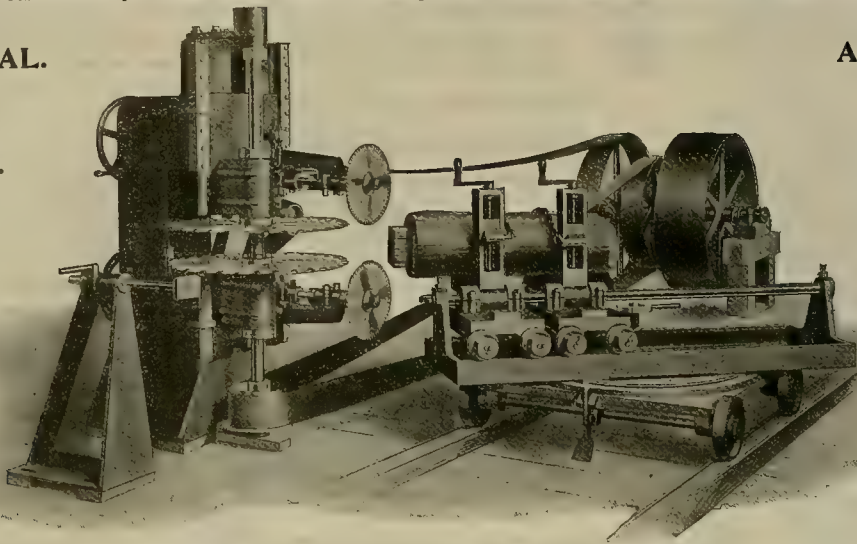
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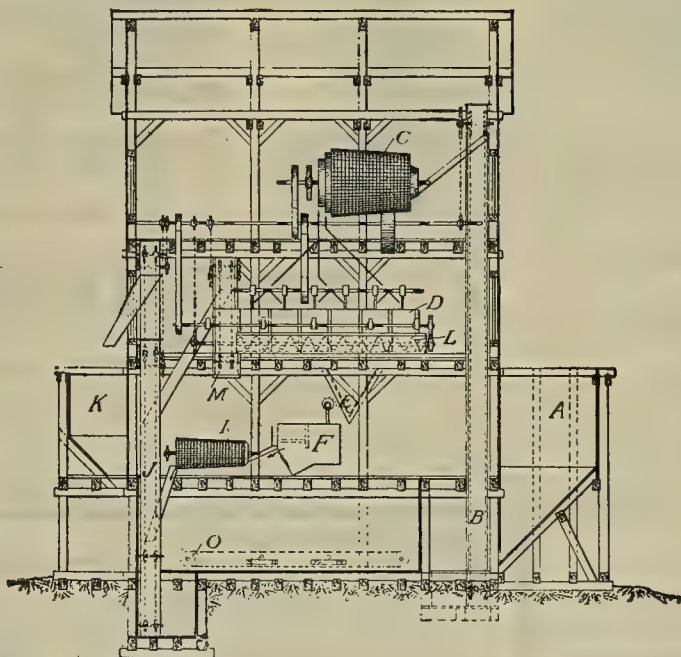
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coal for  
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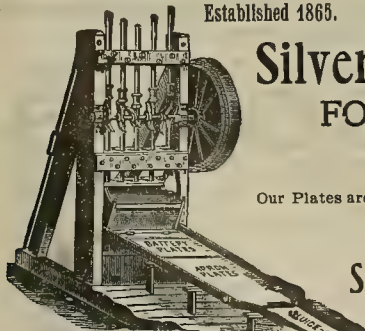
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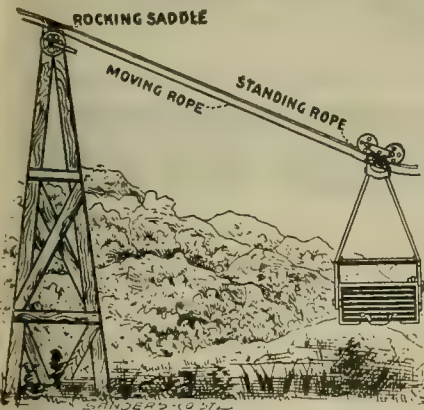
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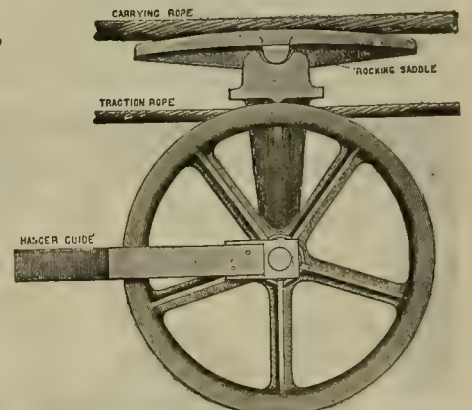
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Adapted for Firing all kinds of Explosives used in Blasting.

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Superior to all others for exploding any make of dynamite or blasting powder. Each Fuse folded separately and packed in neat paper boxes of 50 each. All tested and warranted. Single and double strength with any length of wires.

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All ores which can be concentrated with water, and some ores which slime, yield their values when treated by the

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Which uses no water, is a marvel of simplicity and durability and requires but little power.

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which represents the latest improvement in rock drilling machinery. The standard drill does the work of a 2½" air drill and requires one and one quarter horse power. Driven by electric power.

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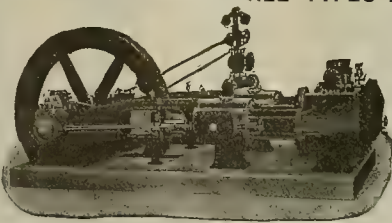
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WE CARRY A LARGE STOCK FOR IMMEDIATE DELIVERY.

BAKER IRON WORKS, SOLE AGENTS,  
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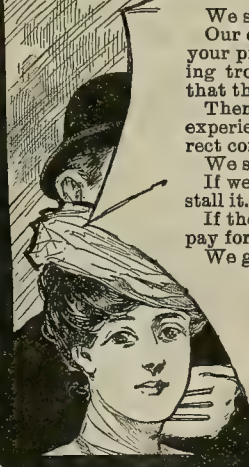
We solve your mine pumping problems. Our engineer makes a personal survey of your property. He listens to all your pumping troubles and takes notes of all the things that the old pump won't do. Then we figure on the conditions. Our long experience enables us to arrive at absolutely correct conclusions. We submit plans and cost. If we get the order we build the pump and install it. If the machine doesn't do the work you don't pay for it, that's all. We guarantee results.

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ELECTRIC MACHINERY FOR ALL PURPOSES.

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STOP THOSE LEAKS OF STEAM, WATER OR OIL WITH

## SMOOTH-ON IRON CEMENTS.

THEY WILL DO IT. WRITE FOR NEW CATALOGUE.

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MESSRS. MADISON, BRUCE & SELLERS,

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## ASSESSMENT NOTICES.

**THE CALIFORNIA DREDGING COMPANY.**—Principal place of business, 120 Sutter Street, San Francisco, California.  
Notice is hereby given, that at a meeting of the Board of Directors, held on the 13th day of September, 1901, an assessment (No. 2) of \$10 per share was levied upon the capital stock of the corporation, payable immediately in gold coin, to the secretary of the corporation, at the office of the company, Room 16 120 Sutter Street, San Francisco, California.  
Any stock upon which this assessment shall remain unpaid on MONDAY, the 21st day of October, 1901, will be delinquent and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 11th day of November, 1901, to pay the delinquent assessment, together with the cost of advertising and expenses of sale.

SAM W. CHEVNEY, Secretary.  
120 Sutter Street, San Francisco, California.

**MARIPOSA COMMERCIAL AND MINING COMPANY.**—Location of principal place of business, San Francisco, California; location of works, Mariposa County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 11th day of September, 1901, an assessment (No. 2) of Ten Dollars per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, Room 223 Crocker Building, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 21st day of October, 1901, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 11th day of November, 1901, to pay the delinquent assessment, together with the cost of advertising and expenses of sale.

By order of the Board of Directors.  
ALEX. GRANGER, Secretary.  
Office—Room 223 Crocker Building, San Francisco, California.

**MARINA MARISCANO GOLD MINING COMPANY.**—Location of principal place of business, San Francisco, California; location of works, Sunny Hill, Shasta County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 7th day of September, 1901, an assessment (No. 2) of one (1) cent per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 11 Sacramento Street, San Francisco, California.  
Any stock upon which this assessment shall remain unpaid on the 14th day of October, 1901, will be delinquent and advertised for sale at public auction; and, unless payment is made before, will be sold on MONDAY, the 4th day of November, 1901, to pay the delinquent assessment, together with the cost of advertising and expenses of sale.

By order of the Board of Directors.  
CHAS. BOVONE, Secretary.  
Office—217 Sacramento Street, San Francisco, California.

**OSCEOLA CONSOLIDATED MINING COMPANY.**—Location of principal place of business, San Francisco, California; location of works, Plymouth, Amador County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 23rd day of August, 1901, an assessment (No. 12) of one (1) cent per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 7 Montgomery Street, San Francisco, California.  
Any stock upon which this assessment shall remain unpaid on the 5th day of October, 1901, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 28th day of October, 1901, to pay the delinquent assessment, together with the cost of advertising and expenses of sale.

By order of the Board of Directors.  
HOLLAND SMITH, Secretary.  
Office—307 Montgomery Street, San Francisco, California.

**WILLETTA MINING & MILLING COMPANY.**—Location of principal place of business, San Francisco, California; location of works, Tuolumne County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 18th day of August, 1901, an assessment (No. 2) of one (1) cent per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, Room 8, 206 Sansome Street, San Francisco, California.  
Any stock upon which this assessment shall remain unpaid on the 30th day of September, 1901, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 21st day of October, 1901, to pay the delinquent assessment, together with the cost of advertising and expenses of sale.

By order of the Board of Directors.  
FRANK E. CORDES, Secretary.  
Office—Room 8, 206 Sansome Street, San Francisco, California.

## DELINQUENT SALE NOTICE.

**ETNA PETROLEUM COMPANY.**—Principal place of business, San Francisco, California.  
Notice.—There is delinquent upon the following described stock, on account of assessment levied on the 23rd day of August, 1901, the several amounts set opposite the names of the respective shareholders, as follows:

| Name.            | No. Cert. | No. Shares. | Am't.    |
|------------------|-----------|-------------|----------|
| J. A. Chancellor | .....     | 7           | \$250 00 |

And in accordance with law, and an order of the Board of Directors, made on the 22nd day of August, 1901, so many shares of each parcel of such stock as may be necessary, will be sold at the office of the company, No. 316 California Street, San Francisco, California, on the 14th day of October, 1901, at 2 o'clock P. M. of such day, to pay delinquent assessments thereon, together with costs of advertising and expenses of the sale.

R. F. MACLEOD, Secretary.  
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Lasts that long under ordinary conditions. First the life of a wagon depends upon the wheels. This one is equipped with our Electric Steel Wheels, with straight or stagger spokes and wide tires. Wheels any height from 24 to 48 in. It lasts because tires can't get loose, no rattling, hubs can't crack or spokes become loose, fellos can't rot, swell or dry out. Angle steel hounds. **THOUSANDS NOW IN DAILY USE.**  
Don't buy a wagon until you get our free book, "Farm Savings." **ELECTRIC WHEEL CO.,** Box 239, Quincy, Ill.

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No dust. No ashes. Cheap, effective, economical, portable and automatic.  
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Take the Santa Fe System to Ash Fork, thence via the SANTA FE, PRESCOTT & PECUNIARY RY. to Prescott. This latter road also reaches Wickenburg, where is located the great Vulture Gold Mine and where the recent marvelous gold strike was made in the Oro Grande.

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Three Daily Trains Each Way Between These Points. Through Pullman Sleepers.  
W. K. GILLET, President. L. R. FORD, Gen'l Freight & Pass. Agt

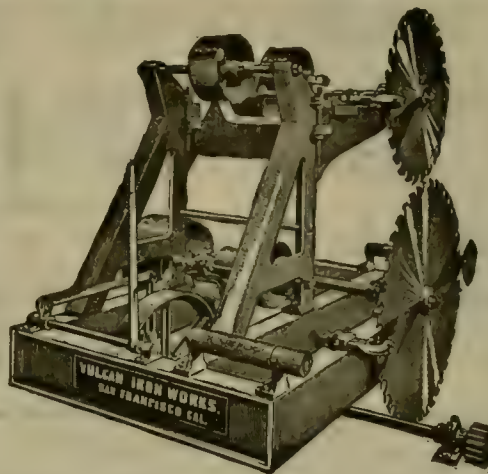
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Single Circular.  
4000-6000 feet per day.

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8,000-10,000 ft. per day.

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15,000-20,000 ft. per day.

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Companies

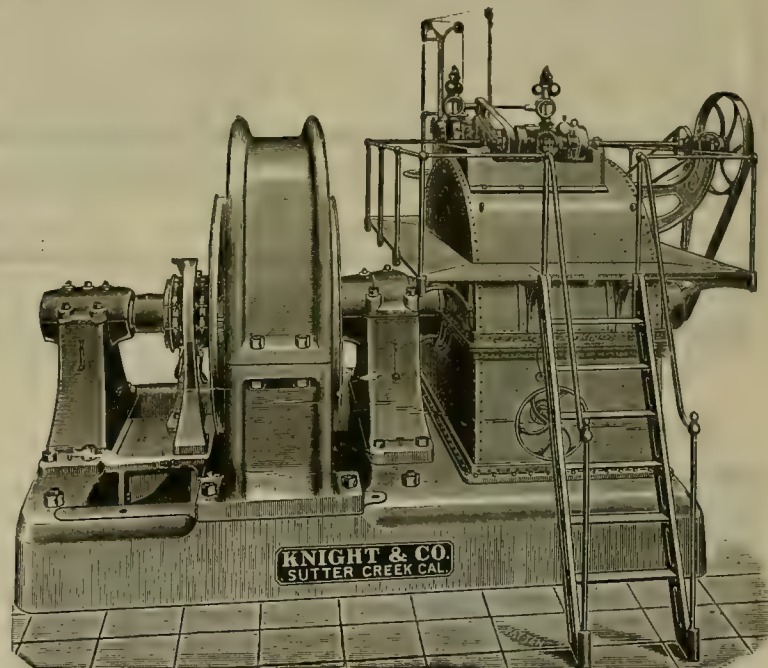
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Remote Points.

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The accompanying cut shows the general arrangement of The Knight Water Wheel, direct coupled to a 750 kilowatt generator, with governor mounted on top of wheel casing. These wheels are designed for 100 to 2500 H. P. Highest efficiency and regulation guaranteed.  
**WHEELS FROM 6 TO 24 INCHES, ENCLOSED IN CAST-IRON CASING.**  
Wheels for mill and reversible hoisting works a specialty.  
**KNIGHT & CO., Sutter Creek, Cal.**  
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Adapted to all Heads from  
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Our experience of 38 YEARS building Water Wheels enables us to suit every requirement of Water Power Plants. We guarantee satisfaction.  
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**FEATURES WORTH CONSIDERATION:**  
Great Capacity, High Speed, Unequaled Efficiency, Steady Motion, Easy Working Gate, Greatest Power from a Limited Quantity of Water, at Smallest Cost.  
**UNDOUBTEDLY THE MOST POPULAR TURBINE MANUFACTURED.**  
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# THE HUG WATER WHEEL

has a guaranteed **EFFICIENCY OF 86%**, as shown by Test Curves from Cornell University.  
**Most Economical Wheel on the Market.**  
**No Loose Buckets Possible.**  
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BY HAND POWER.

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TRENCH PUMPS.

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EDSON MANUFACTURING COMPANY, 132-136 Commercial St., Boston, Mass.

Cable Address: "DIAPHRAGM," BOSTON.

Codes Used: A. B. C., Fourth Edition; Lieber's and Commercial.

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### THE JEANESVILLE Miners' Sinking Pump

HAS THE FOLLOWING ADVANTAGES:

It is designed especially for the roughest and most exacting service.

It is particularly adapted for gritty water.

It is very strongly and yet compactly built, so as to occupy as small a space as possible.

It can be operated in any desired position, either vertical or horizontal.

This pump is an improvement in many ways over other makes of sinking pumps.

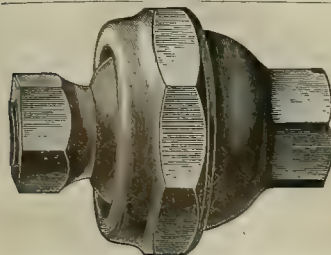
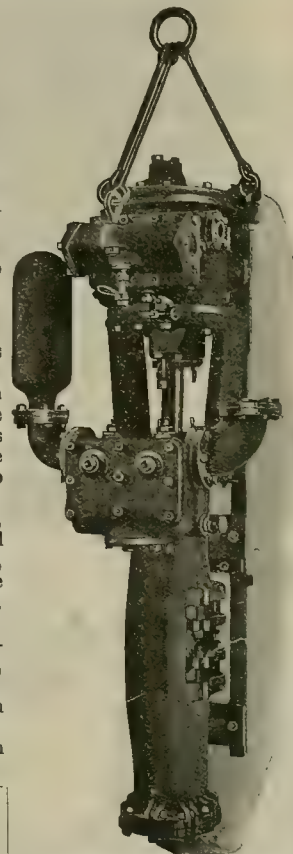
The cap under the Plunger is fastened with Hinge Bolts, one bolt retaining the cap after the rest are released. Also providing Priming Valves in the Water Valve Chest Cover to prime the Lower Valves from Column Pipe, and they are so close as to be in no danger of breaking off.

We have thickened, and thereby strengthened, the wall of water passage leading from lower end of plunger. We have also strengthened the form, without adding materially to the weight of the connecting piece opposite the water passage. These have been weak points in other sinkers.

All parts commonly made of brass, such as water valve seats, valve stems, valve springs, etc., are made of Phosphor Bronze.

All parts are made to gauge, so that they can be easily renewed.

Parts for repairs will interchange with Cameron Sinkers of the same size.



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All Metal Construction.

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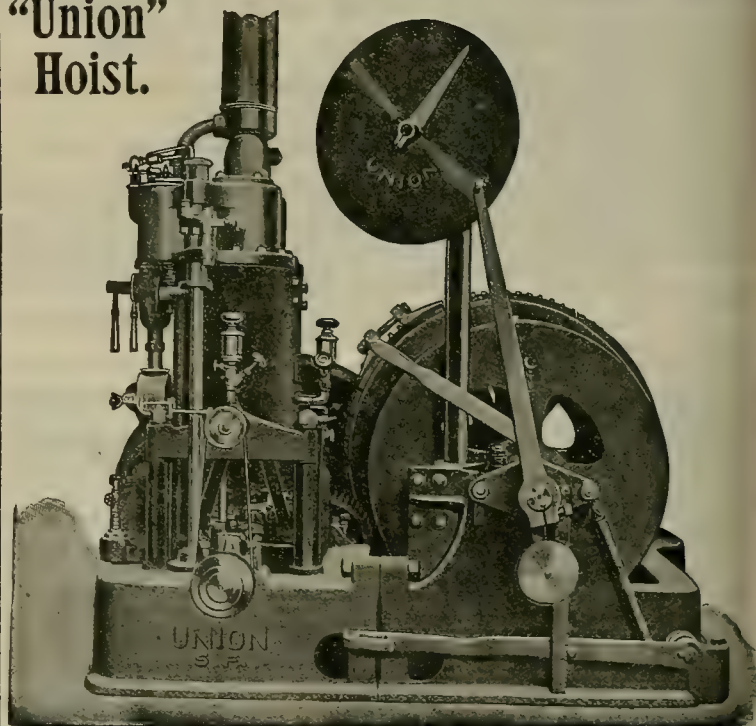
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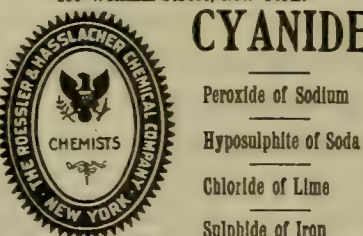


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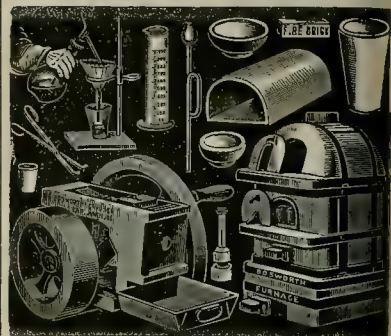
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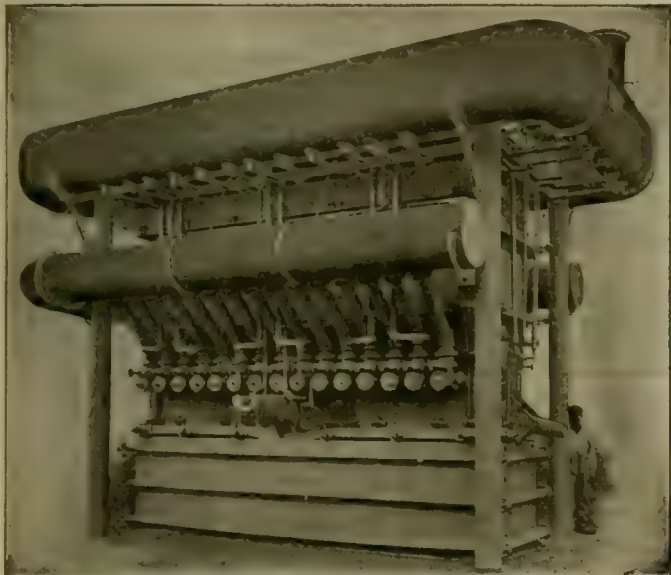
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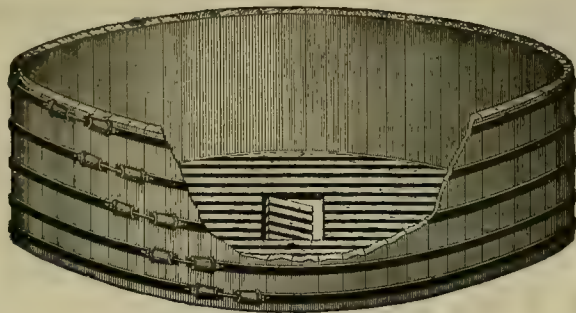
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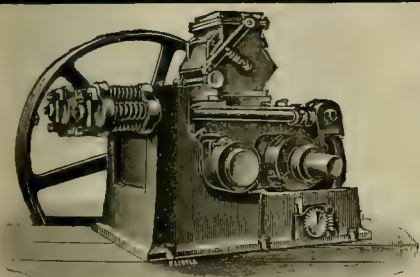
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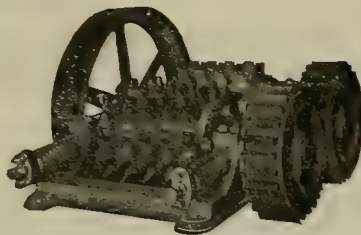
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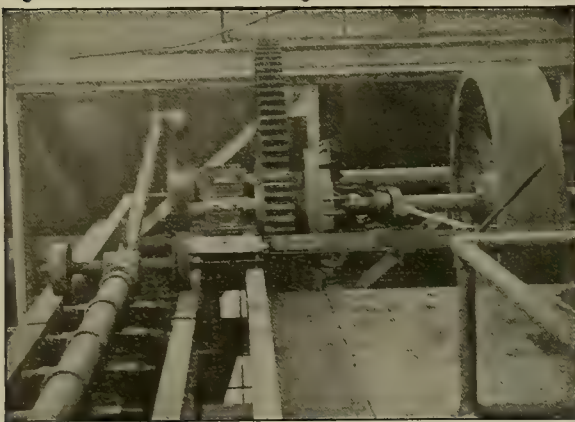
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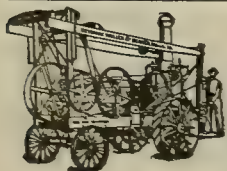
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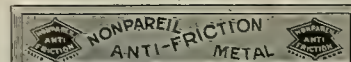
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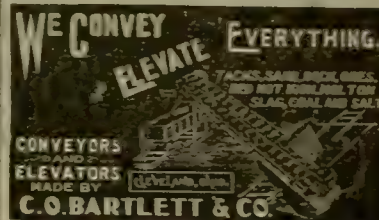


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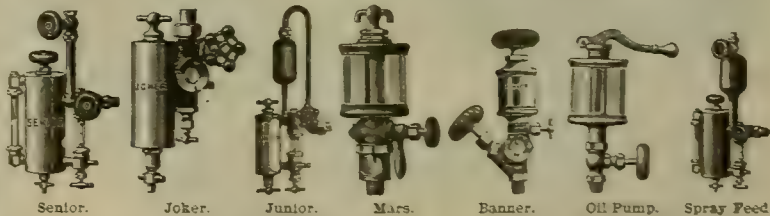
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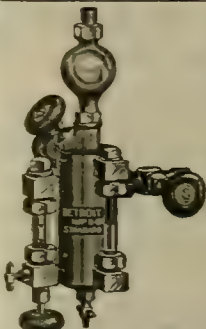
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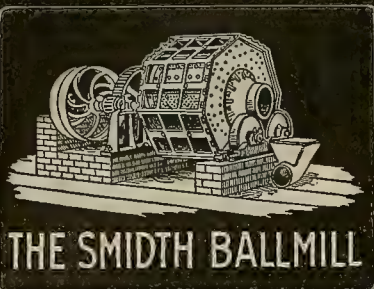
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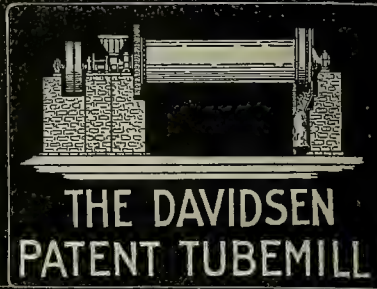


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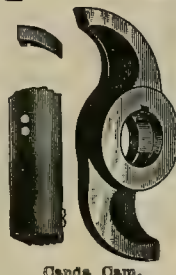
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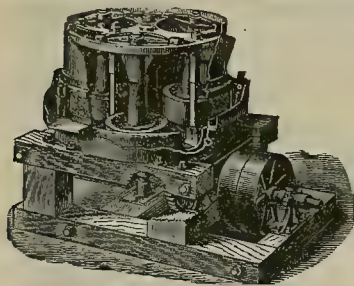
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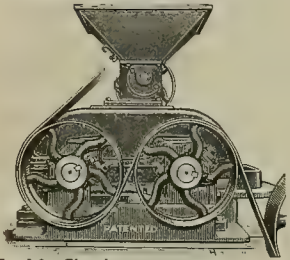


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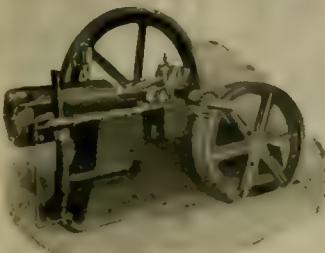
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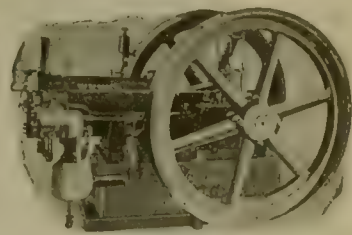
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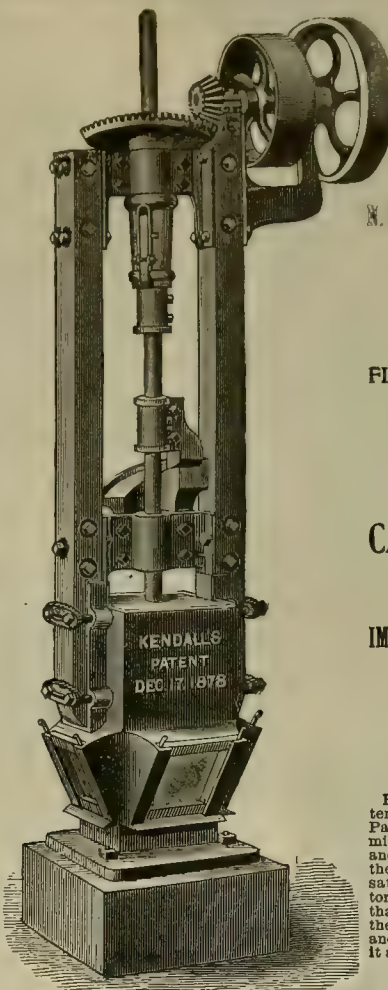
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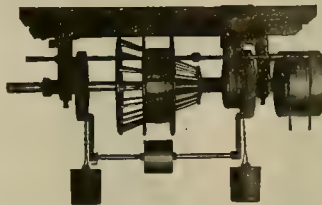
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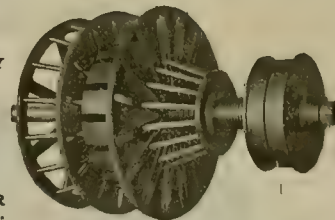
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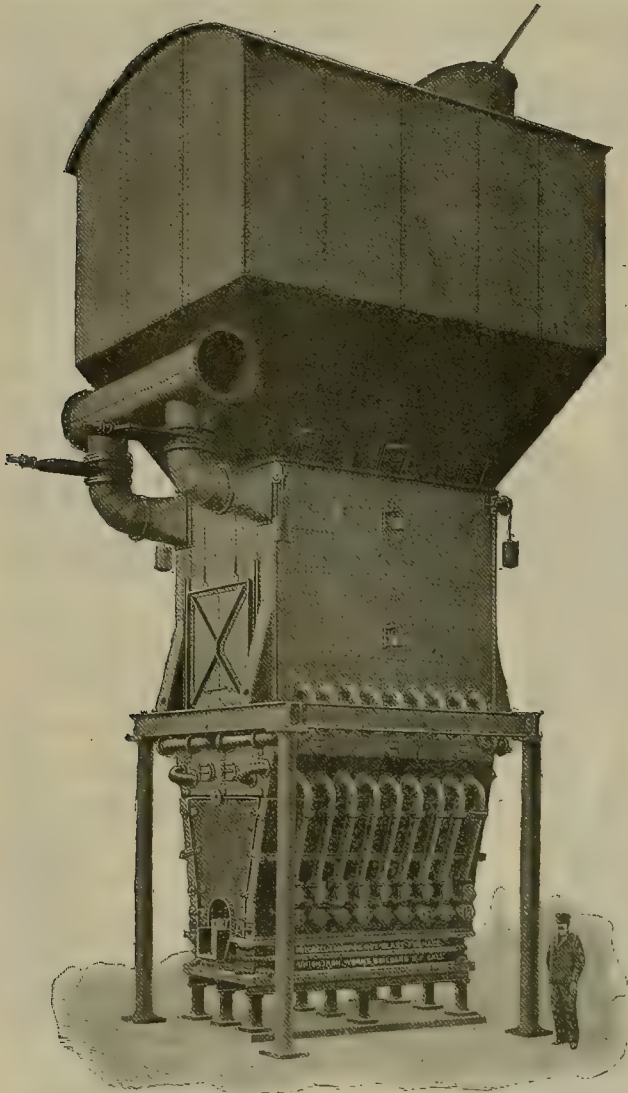
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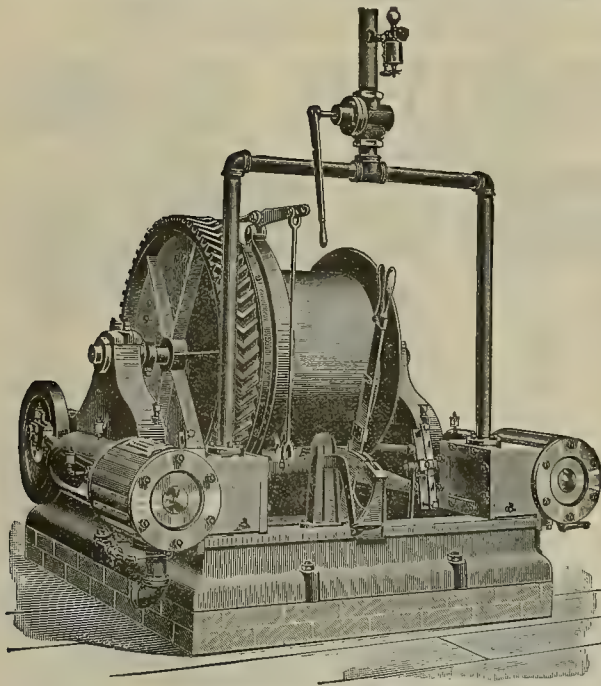
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SAN FRANCISCO, SATURDAY, OCTOBER 5, 1901.

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## Spillway for Earth Dams

The requirements of hydraulic mining, and the climatic conditions in California, have developed details of construction of water storage that have cheapness, combined with efficiency, to commend their novelty. The illustration on this page is of the spillway construction in the earth dam of a mining reservoir at Railroad Flat, Calaveras county, Cal. Reservoir sites of much storage capacity are uncommon in the foothills of the Sierra Nevada mountains, where the mines are situated. The grades of the conveniently located valleys are considerable and the widths rule narrow. Where the width is considerable and the grade moderately flat, the only possible dam construction has a length equal to the greatest width of the possible reservoir. Hydraulic mining is not an industry that justifies large investments in such reservoirs, however essential they may be. The height of dam economically possible rarely runs over 30 feet, and earth and gravel taken from the site are the only possible materials for the dam structure. Clearing of the timber from the site is not done. It becomes water killed, and the reservoir area presents an unsightly appearance, which age does not improve.

The catchment area behind these dams where it provides, as is usual, a water run-off far in excess of the storage capacity of the reservoir made by the dam, necessitates special provision being made to protect the dam from breach. The ordinary construction of waterway or spillway for surplus water is as shown in the illustration. It is built into the dam on one side, as far as practicable from the service outlet, and with its floor either on or in the natural surface. The latter is preferable, so that the approach from the reservoir side is in a cut and the discharge in a cut. The structure is given considerable depth—12 feet in the one illustrated, and sometimes as much as 20 feet, below the top of the dam. The object of this is to keep the water level in



Spillway in Earth Dam, Railroad Flat, Calaveras County, Cal.

the reservoir, during flood or overflow stages of the water supply from the catchment, below any possible danger stage to the dam. The full reservoir level being, say, 3 feet below the top of the dam, the spillway bottom is 9 feet or more lower. When it is desired to have the reservoir full, and there is no surplus to lose, timber gates, for which the large vertical timbers shown in the illustration are the guides, are closed down and the water permitted to fill the reservoir. This form of construction is found

satisfactory as a protection to earth dams having an extreme height of 60 feet. The full depth of the spillway is kept open throughout winter and spring, until the flood season is passed, and then closed down in time to get the full storage before the season run-off ceases to flow.

## The Sheep Ranch Mine, Calaveras Co., Cal.

This mine, an illustration of which appears on this page, is well to the eastward of the Mother Lode system of veins where the latter crosses Calaveras county. The ore vein is a small one, averaging about 2 feet, but remarkable for the great continuous linear extent (1200 feet) of the pay shoot and the uniformity of the yield as the workings extended downward. The mine was opened and operated under the old conditions of California lode mining when cost economies were little known or practiced. The mine yielded in round numbers \$200,000 for every successive 100 feet of depth. This paid dividends to the owners, and costs were not closely held down. The mine in the early workings was opened by inclined shafts and equipped with steam plants sufficient for moderate depths of mining. Ultimately, increasing depth overtaxed the machinery and increased the operating costs, until, at 1200 feet depth, the mine was shut down. As not uncommon under the circumstances, the explanation that received most general acceptance was that the mine was worked out. Really it was the machinery that was worked out.

After several years of idleness it has been reopened. New shafts have been sunk, new machinery installed, and the levels successively below the 1200-foot are found to have the same kind of ore and equal richness of ore with the levels above. Properly equipped and mined, there is found, as with many other old and supposedly worked out mines, more value yet to be mined than already removed.



Sheep Ranch Mine, Sheep Ranch, Calaveras County, Cal.



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STRATTON'S INDEPENDENCE MINE at Cripple Creek, Colo., claims a net profit of \$190,000 from its production in August. The incident is regarded as exceptional by the owners. It is not the record, however. The Utica of Angels Camp, Cal., has exceeded it with a net of over \$200,000 for one month's run. Possibly other gold mines have exceeded the Utica in a single month's output.

THE fact that the Interstate Commerce Commission report shows that mines furnish practically one-half of the railroad freight of the United States is another strong argument for the establishment of the Department of Mines, with its chief a Secretary. Agriculture, which very properly has a Department and a Secretary, furnishes only a fifth as much traffic to railroads as the mines.

THE strike in San Francisco, Cal., of teamsters and water front labor unions, together with the boycotts, was declared off on the 2nd inst. The terms of settlement publicly declared are substantially what was offered by the employers several weeks since. It is declared by parties interested that there are some private stipulations in addition to the terms made public. The machinists' strike is still on, but early settlement is expected.

It is not many months ago that technical journals contained elaborate mathematical discussions, proving conclusively that the reduction of iron ores, and the production of iron and steel, by electricity was commercially impossible. It could not be made to pay in competition with the blast furnace. It was even denied that an electric furnace had been devised for the process. It is now authoritatively stated that the Stassano process was about to be tested on a considerable scale at Darfo, in northern Italy, using a 1500 H. P. water power and planning to produce 4000 tons of steel yearly. Presuming these figures to be found correct in practice, the commercial impossibility disappears. The cost of the power per ton of steel production, including in the cost current interest on the capital invested in the power plant, would appear to be about \$8. This is more than the cost of the equivalent of coal for plants located at Pittsburg and other great centers of steel manufacture. But transportation of the steel to its market is a cost item the difference in which can easily offset the other difference and bring the two productions into the common market on an equality. While the steel production commercially possible with electricity may be limited, the limitation is likely in the end to be largely due to more profitable commercial uses for electrical energy derived from water power.

## The Mechanical Theory of Placer Gold.

The first stamp mill treating gold quartz in the Klondike was started up last month. The location of the mines is on the Dome, the large mountain on the slopes of which are the headwaters of the several creeks which have been so productive of placer gold. The quartz ledges are said to be carrying much gold visible to the eye, as well as fine gold only disclosed in the milling and high-grade sulphurets, pyrite and galena.

This journal on August 7, 1897, published a paper on the newly discovered Klondike placers, prepared specially for it by one of the leading specialists on placer gold deposits and mining. It refers to it now, as in that paper is written a description of the location and richness of gold-bearing quartz ledges in the Klondike, which were yet to be discovered, that is a true description of their location and richness as they have in fact been discovered.

The discovery and successful exploitation of these Klondike ledges is an unqualified confirmation of what may be termed the "mechanical" origin of placer gold deposits. It will be recalled that about this time (1897), when thousands were planning to exploit the Klondike country, other thrifty hundreds, who sought quicker and easier gained fortunes from exploiting in advance the would-be exploiters, caused the display publication of glacial theories of origin of the placers, of theories of origin by expulsion from volcanoes, of theories of condensation from the atmosphere—in short, of any theory that would not suggest by any possibility the simplicity of the truth, and thus bring within reason the hopes of the fortune seekers.

In the presence of the physical facts to the contrary, belief in these illogical theories must disappear. The logical theory has stood the mathematical test of predicting discoveries with exactness. The specialist who wrote the article for this journal in 1897 had not at that time seen the country or the placer mines. No quartz discoveries had been made. The predictions were made by applying the theory to the few facts then known, which were the meager descriptions of the miners and the gold they brought out with the first authentic news of the discovery.

The mechanical theory of placer gold genesis and distribution received its first full and formal statement and explanation in the MINING AND SCIENTIFIC PRESS in 1894. The relation of some placers to some gold-bearing quartz lodes had long before this time been recognized. There was, however, no general acceptance of the principle of derivation of all placer gold from lode deposits, nor had the simple mechanical principles making its distribution from lode sources been recognized.

Nowadays less is heard than was a few years since in disparagement of the theoretical, to the laudation of the practical miner. Still such a belief exists, and is with every new discovery rampantly assertive, to the deception of many well-meaning people. The story of the gold-bearing quartz ledges of the Klondike does not read that way. The theoretical miner with his pen made the discovery four years ahead of the practical miner with his pick.

As a fact, though, the difference is not as wide as the words preceding would imply. The practical miner and prospector does apply a theory to his work. His theory is the resultant of the facts that he knows, as he resolves them. The so-called theoretical miner is really only a miner who has at his command, and works with, the resultant of more facts. The terms are relative, not absolute. While there is always some difference, it is not the same difference. The practical miner and prospector of to-day would be a theoretical miner from the point of view of his predecessor—the practical miner of thirty years ago.

THE Whitney-Ryan-Guggenheim syndicate are reported to be planning a marketing trust for lead producers. Exactly what is the real intention is not disclosed in the little that has been made public. It is, however, probable that nothing more is intended than a close corporation organization of the insiders who control the American Smelting & Refining Co. These people already control the smelting production and refining of the lead through this last named or-

ganization. They have claimed, doing the principal selling, the control of the selling price. The projected new organization of the same people would make a division in the business activities of the American Smelting & Refining Co., this corporation going out of the selling business in favor of a separate organization of its principals. The smelting corporation must, with the giving up of this branch of its business, give up its profits to the new organization. It will be a sort of family affair resembling closely the old Comstock milling companies organized by the directors of the Comstock mining companies to save the companies the risks and losses incident to operating milling plants.

PROSPECTORS should never permit the opinions of other prospectors or miners to deter them from making a full and complete examination of any mineral that to them looks possible of making an ore body. Such opinions freely given were as freely obtained. Rarely are they conclusions from the facts, or even what appear to be the facts, of a personal investigation or prospecting. Again it is quite possible the other fellows may be mistaken in their opinions. Neither should prospectors be turned away from making a personal investigation by the presence of abandoned works and old dump piles. The more pronounced the evidences of age in these old works the more reason there is for not being influenced by their presence. The original prospector or miner whose abandoned work remains may have been looking for free milling gold ore only and very probably overlooked the presence of pyritic gold ores or the ores of silver or copper. There are many known instances of this. At the present time every metal and many non-metallic minerals have possible values that should not be overlooked. Old dump piles are sometimes pretty good mines, even if they were made and abandoned a quarter of a century since. The prospector should remember he may be looking at the possible mine from a different point than occupied by his long departed predecessor. Another good rule for a prospector is not to locate everything that looks possible that he sees. If having given all the time that is reasonable to the prospect, and it shows nothing of value, better abandon it and look for something else. It is a waste of good money to record locations that do not show good prospects, and location closes the ground against exploration by another prospector without doing the first one a particle of good. Give the other fellow the chance you have discarded as worthless. It is what you would ask for yourself, and he may from a different point of examination find in the prospect the mine you have missed. The mere act of location of possible mineral bearing land is not prospecting. The pick, shovel and pan and not the hatchet and lead pencil are the prospector's tools. When the prospector does find what may be a mine he should develop it instead of waiting for some one else to do it for him, but be sure you have the mine before you decide to stay with it.

SOME of the local capital of Idaho Springs, in Clear Creek county, Colo., is being invested in the interest of the local mine owners, in opposition to the large smelting and milling corporations. A milling plant is being constructed, to be operated in principle, co-operatively, under corporate organization. There is a practical recognition of the milling or beneficiation treatment of ores being a part of the business of mining. Mine owners, presumably those who contribute to the capital, are to get a share in the profits of mill treatment of their own ores and of the profits of mill treatment of ores of mine owners who are not contributors to the capital of the milling corporation. It is readily to be comprehended that these mine owners are independent of outside combinations of capital or treatment plants. The mill they operate may not give the lowest flat cost of reduction for their ores, but the difference is less than the profit the outside capital in treatment plant would add to the lowest flat cost, and these mine owners are at no one's dictation as to the quantity of output their mines shall make. The example of these Idaho Springs mine owners should have the compliment of imitation elsewhere. It is certainly the preferable way to settle differences of opinion as to ore treatment and reduction charges by becoming independent of them.



## Concentrates.

THE cheapest plant for raising 1000 gallons of water per minute 25 feet would be a centrifugal pump with an electric motor or gas engine direct coupled to it.

TO STOP the banking up of the battery sands under the No. 1 or No. 5 stamps make those stamps heavier, preferably by heavier bosses or by keeping full weight heads on them.

"CONCENTRATES" has no record of giant powder exploding in a stamp battery through its being fed in with the ore. Better let some other miner do the experimenting and finding out.

A COLORADO trial court has decided that membership in a stock exchange was a personal privilege and not property, and that it was not subject to attachment and other processes of law.

EVERY person doing business in Alaska is required to pay for a license. In the Juneau district in 1900-1901 this tax aggregated \$100,000, which paid the court expenses and netted \$60,000 to the U. S. Treasury.

THE monthly statement of the Director of the Mint shows that the total coinage executed at the mints of the United States during September, 1901, was \$8,160,401, as follows: Gold, \$4,100,177; silver, \$3,899,524; minor coins, \$160,700.

THE chairman of the executive board of the American Smelting Co. has stated that experiments made by the company show that beyond any question crude petroleum is the preferable fuel for lead smelting and that it has passed the experimental stage of investigation.

IT is said the largest pipe line laid for a Colorado mine has been put in by the Gold Pan M. Co. at Breckenridge. The pipe is of steel, 5 feet in diameter, and the line is 8000 feet long, giving 350 feet of pressure for hydraulicking. The pipe is laid in a trench 7 feet deep.

IN building the concrete floor and walls of the New York subway the construction consists of a thick band of concrete next the earth or rock, then several layers of asphaltum saturated felt, and an inside thick band of concrete. This construction is said to keep the damp outside of the subway.

AN economy of wood fuel is effected by covering and protecting it from rain and snow after it is once dried and seasoned. Records kept at a mine using twelve cords daily indicated that one-fifth more wood was used for fuel where the wood was taken as required from piles exposed to the weather.

THE smallest entry of land as a lode claim made for patent is .004 acre, 175 square feet, the Mineral Rock lode, applied for by the Stratton-Cripple Creek M. & Dev. Co. to protect other and larger holdings. Small as the tract is, it is said the company has expended several thousand dollars in contest over the title to it.

THE cross section of the new Croton dam for the New York City Water Works now under construction has a water face nearly vertical and the down stream face a slope of 50°. The foundation of the dam goes down 131 feet below the natural stream bed and the superstructure rises 160 feet above it, making the total height approximate 300 feet.

CONDENSING STEAM ENGINES require from twenty to thirty times the amount of the boiler feed water to do the condensing with. Approximately, the supply of condensing water should be 1½ gallons per minute for each indicated horse power of the engine. It is usually estimated that the use of a condenser will decrease the fuel consumption from 20% to 25%.

FOR a tunnel or drift grade 5 inches to 100 feet is found to work very satisfactorily. Where cars are moved by hand, the loaded car will run itself down this grade without having to be continually braked, and the unloaded car can be pushed up grade at a rapid walking speed. Where animals are employed and cars are handled in trains, 3 inches to 100 feet, or even as little as 1 inch to 100 feet, can be operated satisfactorily.

THE first thing to do in beginning the proceedings of application for patent to a mining claim is to see that the record of title is clear and complete. Many defects that are found out before applying for the official survey can be straightened out by a relocation. The discovery of them after the application for the survey has been made may necessitate both the relocation and the beginning over again of the application for survey.

WHILE a notice of location does not have to be recorded except in compliance with State statutes or local laws, customs and regulations of miners, the U. S. Land Office, in application for patent, requires a certified copy of the notice of location from the records of the office of the recorder of the county in which the claim is located. Such a record is best made at the time of making the location, though it can be made at any time before application for patent.

THE Supreme Court of California has ruled that the statute as regards the marking of the boundaries of a mining claim was sufficiently complied with by stakes at the corners and a location notice posted on a side line, the ledge being sufficiently developed to show its existence and direction. It appeared that some of the lines in brush were not cleared, but this was held to be immaterial. The decision is opposite to rulings made by some California trial courts in cases where similar questions were raised. It emphasizes the common sense of the

matter by making the ruling in each particular case depend on the facts in that case. If the fact is that the marking is such and the description of them in the notice such that they can be readily traced on the ground the claim is properly marked, independent of literal hair-splitting readings of decisions.

A CORE of puddled clay in an earth dam is preferable to a sheet piling core. The earth and gravel filling of the dam cannot well start the clay core leaking and it can open up the seam of the sheet piling. The latter again may become sprung by the pressure of the saturated filling behind it. A leak once made in it by saturating the outside face of it would lessen its supporting power. Where inside and outside earth masses both contain clay and are both puddled in place in construction the sheet piling answers its purposes very satisfactorily.

IN breaking out a tunnel or drift heading, it is preferable to keep the floor well down, so that there is always a clearance below the bottom of the track ties. After the ties are laid and the rail spiked to them, the track is ballasted with spoil from the heading and brought to true grade by tamping bars. This method of driving and track building lends itself to the easy construction of a water drain on one side of the track way. It is a much more economical and satisfactory way to accomplish the construction of a drain than to blast it out in a separate cut.

THE quotation from the mining report in words, "Providing the ore holds as it is at present, the supply ahead on this one vein is practically inexhaustible, and judging from the samples assayed of an average value \$18 per ton," means just what it says. It says nothing at all. It is intended by stating the promoter's presumption to develop the faith of the prospective investor in stock to the point that he shall give up his money, quickly and cheerfully. The failure of an investment in the ground based on such qualified declarations should not be charged to bad mine management when it is really due to bad judgment in making the investment.

THE copper placers in Alaska are close to the north and south boundary line with the Canadian district of the Yukon. They are in the headwaters of the White river, a branch of the Yukon, or are in the headwaters of Copper river, emptying into the gulf of Alaska. They have been explored from Dalton's Post, on the Alek river, as a base. The country is exceedingly difficult of access and travel. The copper occurs native in moraines. Water is in abundant supply and the wash contains commercial quantities of the metal. The season, however, is short, and, without other natural resources in the country, railroad construction is not justified. The copper in these placers is simply unavailable.

SECTION 5508 of the Revised Statutes of the United States is as follows: If two or more persons conspire to injure, oppress, threaten or intimidate any citizen in the free exercise or enjoyment of any right or privilege secured to him by the Constitution or laws of the United States, or because of his having so exercised the same; or if two or more persons go in disguise on the highway, or on the premises of another, with intent to prevent or hinder his free exercise or enjoyment of any right or privilege so secured, they shall be fined not more than \$5000 and imprisoned not more than ten years; and shall, moreover, be thereafter ineligible to any office, or place or honor, profit or trust created by the Constitution or laws of the United States.

WITH ore and waste broken down together in the mine some sorting should be done at the first handling, when they are being put into the mine cars. Large pieces of waste rock should be taken out at once, and if they can be used for filling they should not go out of the mine at all. Before hand sorting to throw out waste, when the material is on the surface, it should be washed over fine-meshed grizzlies and the settlings from the washing water treated as ore. Waste that is barren rock and waste that contains some ore values that may by a change or improvement in methods or prices become low-grade ore should not be dumped together. The latter should be piled separately and in a position to be easily handled, should it become desirable to make use of it.

IT is always well to remember in prospecting that the surface the prospecting starts from is an accident—if so broad a term can be used—that neither proves nor disproves the possibilities of value with depth. The surface is simply the temporary place that erosion has made on ore-bearing lodes. It may be the erosion has cut down to pay ore and exposes it on the surface. It may be it has cut past the pay ore, distributing it, if gold, in placers, and that the lode is nothing but the channel through which the ore-bearing solutions passed to higher points. It may be that the erosion has cut down nearly to but not into the ore. The condition is one that requires judgment to guess on, whether to follow the indication or to leave it alone. Geology and mechanics help materially to guessing right, and what they indicate should not be neglected.

THE first thing to do in prospecting a lode discovery in Alaska is to scrape the moss off of it. By this is not meant to clean off 2 or 3 square feet and break off a piece or two of the outcrop with a hammer, but a complete stripping for a considerable distance of the apex of the ledge. If very wide, this can be a series of crosscuts. As a rule, there is rarely little soil or broken rock to remove.

The ledges, as a rule, stand out from the wall rocks, covered only by moss and vegetable mold. In addition to the stripping, break into the ledge matter by a number of shallow cuts. They are preferable for the preliminary prospecting to a shaft or tunnel started without a complete surface opening to guide the locations of the more pretentious work. When the surface is opened up and sampling has located its best values, there is something definite to show a possible purchaser or to use as a basis for the further work of prospecting. By all means know the surface of lode discoveries before doing any underground work. Mines have been overlooked and missed by failure to place the tunnels or shafts where the ore values were.

THE Supreme Court has never passed on the question as to whether or not a vein could be followed on its dip under a previously granted agricultural patent. The United States Circuit Court has decided that the vein discovered after patent has issued to the agricultural entry cannot be followed under it, and a few months since a Nevada State trial court decided the other way. This last contest is now in the United States Circuit Court and may reach the United States Supreme Court on appeal. There is a possible phase of the question that may appear as a vital element in determining the ruling of the courts. A vein may be known and may have been claimed and become forfeit prior to the issuance of the agricultural patent. Later a relocation is made. In this case it is possible that the courts would construe the date of discovery of the lode not to be the date of its relocation, but the date of its original location, and would then hold that the right to follow it on the dip under the agricultural patent existed. In other words, the vital facts in such a contention are the existence of value in the lode, and the knowledge that the lode existed before the date of granting the agricultural patent.

WHEN title is obtained to a group of unpatented mining locations by mesne conveyance, and it appears that the boundaries and corners are not properly established, it is usually preferable to make relocations by survey rather than simply re-establish the boundaries of the original locations where the latter were located without survey and without proper establishment of boundaries. The relocation should, however, commence with a survey and platting of the old locations to preserve a record of the physical facts of their monuments, and to have more exact data for laying out the relocations. In this latter as few claims should be made as practicable, and no surface should be left uncovered between locations. Avoid making locations that conflict with each other. Make the lode lines follow the apex lines of the lodes and establish parallel end lines at right angles to the strike of the veins, and not to the apex line, where the latter is not a straight line. In applying for patent, apply on the relocations which have in the U. S. Land Office the effect of new locations. In the event of an attack on the title the old locations can be pleaded to defend it. No rights under the old locations are lost by relocation.

IT has been established that compressed laminated zinc made in the form of thick plates for application as an inside boiler lining, to prevent oxidation and incrustation, is greatly superior to the old method of using raw pig zinc for this purpose. In the use of the pig zinc the galvanic current developed transforms the pig of raw zinc into a more porous substance, in which the metallic molecules are isolated one from the other by the corrosion which is quickly produced, resulting in this, that the intimate metallic contact, which causes the generation of the electric current, is eliminated. Compressed laminated zinc, on the contrary, resists the spongy internal corrosion, as it corrodes only on the surface, thus being very slowly consumed and being capable of conducting the current as long as a metallic nucleus remains. The application of the laminated plates is very simple. They are applied to the walls of the boilers by means of strips and are so distributed that the galvanic action is exercised in an even way, when possible, over the entire surface of the iron. When oxidation is produced in any part of the boiler, it is because the nearest zinc plate is too far away. By this employment of pressed zinc the incrustation of the boilers is avoided, and at small cost.

THE waste heat of steam—that between 140° F. in an 80% vacuum and 60° F., the temperature of condenser water—has been successfully utilized for evaporating sulphur dioxide (SO<sub>2</sub>), which has a much lower boiling point than water. At 140° F., SO<sub>2</sub> vapor has a pressure of 156½ pounds per square inch and at 60° F. a pressure of about 41 pounds per square inch. The SO<sub>2</sub> is vaporized by the heat of the exhaust steam in a special boiler called the "atomizer." The vapor is used in a single cylinder engine either connected with the same driving shaft or put on a separate one. Its work being done, the vapor goes into a SO<sub>2</sub> condenser, becomes liquid, and is pumped to the atomizer again, being used over and over indefinitely. Special construction and packing are required to make the whole apparatus air and water tight. With an apparatus as described attached to a 150 H. P. triple expansion engine of high efficiency an additional energy was obtained from the SO<sub>2</sub> engine equal to 34.2% of the power developed by the triple expansion steam engine. When working it reduced the steam consumption from 11.2 pounds to 8.36 pounds per indicated H. P. hour, which is in effect the saving of 25.3% of the fuel consumption. Another similar engine worked with the waste steam heat of a double expansion engine of 630 H. P. added 41.7% to the total power developed.



## The Purchase of Mining Machinery.

Written for the MINING AND SCIENTIFIC PRESS by FREDERICK T. SNYDER.

There are two aspects to consider in the mining machinery bargain, one, the items to be purchased, the other, the method to be used in making the purchase. In practice this latter is necessarily settled first, and usually resolves itself into a question as to whether the manager or superintendent, who is to operate the plant, will obtain the best results in making the purchase or whether the interests behind the investment will be better served by the employment of one or more specialists. There are two parts of the transaction for which this determination has to be made, either unconsciously or with deliberate forethought; one, a technical part, the determination of what to buy; the other, a commercial part, the ordering of the machinery and the closing of contracts. The skill used in determining what to buy determines a profit or loss of large magnitude. The difference between the possible results of ordering or contracting for the machinery in one way or another is smaller, but may be an amount that would show up well if applied to dividends. If an amalgamating plant is selected where a leaching plant is required, the direct loss and delay may involve the capital of the enterprise. On the other hand, the leaching plant may be secured much cheaper by one management than another, as a result of a wider knowledge of the market or better commercial methods.

The cost of assistance by a specialist in such matters does not increase directly in proportion to the amount involved. It takes little more time to determine and make purchases for construction amounting to \$50,000 than for \$10,000, and in the long run the cost of all kinds of service tends to become proportionate to the time required. The possible saving in the use of such service is directly proportionate to the amount expended. It thus results that assistance to the operating management does not pay in the case of small amounts and does pay in the case of large amounts. This is further modified in the two parts of the matter, as the greater profit or loss possible in the determination of what shall be bought allows a margin for skilled help on smaller amounts, than is warranted by the smaller variation possible in the results of different commercial methods. We find that this corresponds with practice. On small purchases the machinery to be bought is determined and the purchase carried out without assistance by the operating management. On a medium-sized proposition the determination of the machinery to be purchased is put into the hands of special assistance and the ordering alone determined by the operating management. In installations involving the largest investments the plant is frequently designed, purchased and completed before the manager who is to run it becomes connected with the matter. From the standpoint of the investor, the best operating manager is the one who stays steadily in one place, becoming more and more effective in its routine; the best constructing manager is one who moves about from place to place, becoming familiar with the many different ways in which certain results have been obtained among different conditions. As the expenditure under the direction of the construction manager in a given interval of time is much greater than that by the operating manager, he will naturally be a man of greater ability and cost. It neither pays the investor to hire construction ability to do operating work, nor warrants the risk of doing construction work with operating ability.

In this country a strong factor is gradually obliterating the distinction between the technical and commercial parts of the bargain, and the designing and constructing engineer is becoming more and more of a purchasing agent. This factor is the absence of standards in the design and manufacture of mining machinery. Each manufacturer has independently worked out, along different lines, a good solution of any given problem, and specifications broad enough to include desired competition are not detailed enough to protect the non-technical buyer.

The machinery offered may entirely meet the situation it was originally designed for, and yet fail entirely to meet an apparently unimportant condition of the problem in hand. A single machine detail may prevent the operation of an entire plant, and while the manufacturer stands ready to renew (f. o. b. the shop) the part proving defective, this does not recoup the earnings lost during the delay, nor rearrange the company's finances to the date of the deferred start. A consideration of the details by a competent technical specialist, who has studied the conditions under which the apparatus must be used, will alone insure safety. The first part of the purchase becomes combined with the second; what to buy is not determined in detail until the order is practically placed. In this way the constructing engineer, doing frequently what most operating managers do only once or twice or at intervals of several years, acquires a commercial experience along his particular line that is of substantial value to the investor. For the technical part of the work the fee paid the specialist is a sort of insurance premium to guard against mistakes. In the commercial part it

should represent a direct saving, and on the general basis of engineering fees in this country, it is reasonable to expect on investments of \$10,000 and over that the business ability of the specialist will save more than the insurance will cost. To secure disinterestedness and promptness the fee should be a definite sum, agreed upon in advance, and not a percentage of the total investment nor a per diem for the time used. The choice of special assistance in a machinery purchase should be by experience and ability. The determining comparisons of experience and ability are questions of fact. The amount that has been expended under the direction of a man measures his experience, and the profit made for the interests represented in that expenditure measures his ability.

Another factor that has operated to combine the technical and commercial parts has been the willingness of the manufacturer of mining machinery to finance the employment of the specialist. They have paid his salary, and while making no separate charge for such service, have passed it up to the consumer by adding it to the price of the machinery. This has led to waste in the duplication of the engineering of a plant by several competing manufacturers. In the future the growing combination among manufacturers may prevent this waste, but will also remove the competition that originally forced the manufacturer to supply the specialist. At the same time combination among the mines will increase the size of the plants to be built and make the use of a designing engineer more warranted. The outcome of these tendencies will probably be the more frequent direct employment of the construction specialist by the mine owner, with the resulting advantage of technical representation on the investor's side of the machinery purchase. Owing to the economic advantage of standard and duplicate manufacture, the designs of the individual machines will probably remain with the manufacturer, while the arrangement of the machines into a complete plant, owing to the great variety of conditions under which plants are built, makes the use of stock plans a probable loss to some one, and will eventually force the preparation of a special design in each case, closely taking advantage of local conditions—work that is properly not a part of manufacturing.

The exaction of a commission from the manufacturer by a representative of the purchaser, already paid to the amount warranted by ability, will naturally grow more impractical as competition decreases among manufacturers, and is so to a considerable extent to-day, the manufacturer strongly resisting any commissions that have to be paid out of profits below the line of competitive prices. If the representative of the buyer is underpaid and uses this method at the expense of the purchaser to bring remuneration in line with ability, it only illustrates the old difficulty of getting something for nothing. Whether the specialist is to be an employee on a regular salary or an independent engineer with a general practice is entirely a matter of the amount of work to be done for one set of interests. Plant construction and its attendant machinery purchased to the amount of \$100,000 a year warrants a better man than could be profitably employed by the year for work to the amount of \$10,000, and ten companies, each using one-tenth of his time in supervising their work, will be better served than by ten men of the grade warranted by \$10,000 worth of work a year. As these companies combine, in accordance with the economic tendency of the times, this one man ultimately becomes the salaried employee of one consolidation, but his work remains the same.

It not infrequently happens that the non-technical buyer, realizing the limitations of his position, undertakes to secure by financial guarantee the results desired. The alternative is a poor one. The guarantee, assuming that it can be obtained and is backed by sufficient responsibility, does not in any way increase the engineering ability of the undertaker. The plant may fail to do the work in spite of the guarantee, and while part of the amount of its cost may be recovered with the aid of a lawsuit, it does not nearly equal the contingent loss due to the delayed dating on the financial arrangements nor the depreciation in the total value of the property by the record of a failure. The guarantee measures the confidence of the contractor, not the efficiency of the plant or machinery. Commercial responsibility is most desirable, but will not take the place of engineering ability. The desire to secure a combination of the two has led to the development of the contracting engineer. Under this plan the design work—the examination of the conditions and the preparation of plans and specifications—is carried out on the basis of a consulting engineer. When completed, the engineer enters a bid in competition for carrying out the designs and delivering the plant in operation. If the contract is awarded to him, no separate charge is made for engineering. If it goes to a lower bidder, the engineer supervises the construction and both supervision and design are paid for on a consulting engineering basis. Owing to his familiarity with the details, the engineer is usually in a position to underbid any competition. This plan enables the investor to use the best available engineering judgment and insures that the design is thoroughly carried out at the lowest practical cost.

The method of making the purchase settled, there

remains the determination of the items to be bought. In this there is first to be decided the question of the kind of machinery to be bought. The conditions to be met determine this. There should be as much of facts and as little of opinion as possible. What has been successful elsewhere under the same conditions is what is wanted here. Sometimes a new combination of conditions forces a new solution, but such cases are far from common. Mining as a business shuns experimentation.

Next is to be settled the amount of each kind—in other words, the investment. The function of all machinery is to reduce the labor item per unit of production. The size of the investment is controlled by this. Mining machinery proper, as distinguished from handling and reduction machinery, also reduces the cost of capital per unit of production, as it reduces the length of the investment, by increasing the amount of work that can be done in a given time per unit of available working space. With handling machinery, such as hoists, tramways, etc., the cost of operation decreases per unit of production both as the investment increases per unit and as a whole. A compound condensing hoist brings up ore more cheaply per ton than one with simple engines, and the largest hoist takes less men per horse power than the smaller one. With reduction machinery, both the cost of operation and the profitable returns increase with the investment per unit. As the investment per ton operated on is increased, the profitable returns first increase faster than the cost of operation and then more slowly, so that, beyond some point in each case, additional investment means a loss per unit of production. Two vanners in place of one would produce more concentrates and cost more to run, but probably show a net saving. Four in place of one would show a saving but little larger than the two, while the additional cost of operation would probably absorb all the difference. The great saving per ton of a large plant over a small one, which exists to a considerable extent as a belief of the popular mind, is not due to the larger absolute investment in reduction machinery, but to the saving in the labor item in the use of handling machinery, and it should so enter into calculations regarding increased reduction capacity. As all mining operates up against a limit fixed by the boundaries of the ore bodies, any increase in investment represents an increased charge per unit of total production.

Another factor affecting the size of all investments in mining machinery is the compound interest on the net value of the output, which begins as soon as it is marketed. In the special case of a dredger working well prospected placer ground, this is the controlling factor in determining the number of yards to be reserved for a given dredger investment. That is, at the end of an interval of ten years, one dredger with a given amount of ground will show a smaller net return than two dredgers working out the same ground in five years, the interest on the output for the average difference of two and a half years being much larger than the total depreciation on the cost of the second dredger.

Whether any proposed investment in machinery means a real net saving depends on its relation to the point where these different effects balance. Usually sufficient data is available as to ore in sight and operating charges to make it a matter of fairly close calculation. Ore out of sight and hoped for has properly no place in such calculations. It is so common to do things with machinery that it is frequently lost sight of how many things can be done by hand tools, and investments are occasionally entered into where the same amount invested in wages would show a higher net return in the end.

Naturally, the parts of an equipment should be uniform in size. The loss of interest on unnecessary capital put into air-drill capacity that will break more rock than the hoist will handle, or into a hoist that will put more rock on the surface than the mill will reduce, comes out of dividends. It is especially desirable that the total funds available be put up against the total work to be done, and the latter undertaken in such proportion that the funds can be reasonably appropriated to cover the whole. It does not lead to profit to have mill and no mine, nor a mine plant and no method of reducing the ore.

A PARTY of directors from New York made a visit to and examination of the company's placer mine in Nevada. On their return, among other matters, they reported that the placer ground was undoubtedly very rich and exhibited about \$90 in gold dust which they said they had panned out at places of their own selection. It seems they had driven over the ground, a valley several thousand acres in extent, and had their hired driver dig and pan samples of the surface ground at points they selected. Still they were unable to understand why the mine failed to pay.

THE Pacific Coast Oil Co., an ally of the Standard Oil Co., will this month begin laying an oil pipe line 250 miles from Bakersfield, Cal., to Point Richmond, on San Francisco bay. A thousand men will be employed in its construction. The work is estimated to cost \$3,000,000. There will be ten pumping stations along the line.



### Genesis of Ore Deposits.

TO THE EDITOR:—I have read the very interesting article by Matt W. Alderson on the "Genesis of Ore Deposits," and must confess his deductions are rather startling and smash the old idols (theories) at a blow.

The man who wishes to keep abreast with the advance of the world in any line cannot be conservative in these days; but, on the other hand, he must not be too prone to follow blindly every theory advanced. Though laying no particular claim to deep knowledge on the subject, and while acknowledging the ingenuity of Mr. Alderson's theory, still, I can not make this theory of his fit some of the cases that

as shown in Fig. 2. In fact, these two sketches are taken from different parts of the same ledge, on the same level, about 500 feet apart and 700 feet vertical from the surface. That changes do take place in many ledges after formation is, I think, apparent to any mining engineer of five years' practical experience.

I have often seen marked signs of a secondary crushing of ledges, perhaps into minute grains, and a redeposition of its mineral contents encased in a different mineral deposit from the original gouge. These secondary changes are undoubtedly the cause of the so-called oxidation, and are wholly due to the action of the solutions of favorable character on the crushed ledge matter, circulating through the thousands of interstices before recementation takes place.

In fact, water charged with any one of the many sulphides that are known to precipitate the various mineral and metallic salts (sulphates), with the known thermo-electric forces in the earth acting on the crushed and re-ground rock of the encased ledge, could and undoubtedly has altered, in many cases, the original character of the ledge matter.

In regard to the possibility of nature to form such walls as are found on the sides of fissure veins, I should judge that the very fact of their existing was proof that it was possible for nature to form such walls.

In the replacement theory one can see readily how the walls are formed and the banded formation shown in some ledges be accounted for.

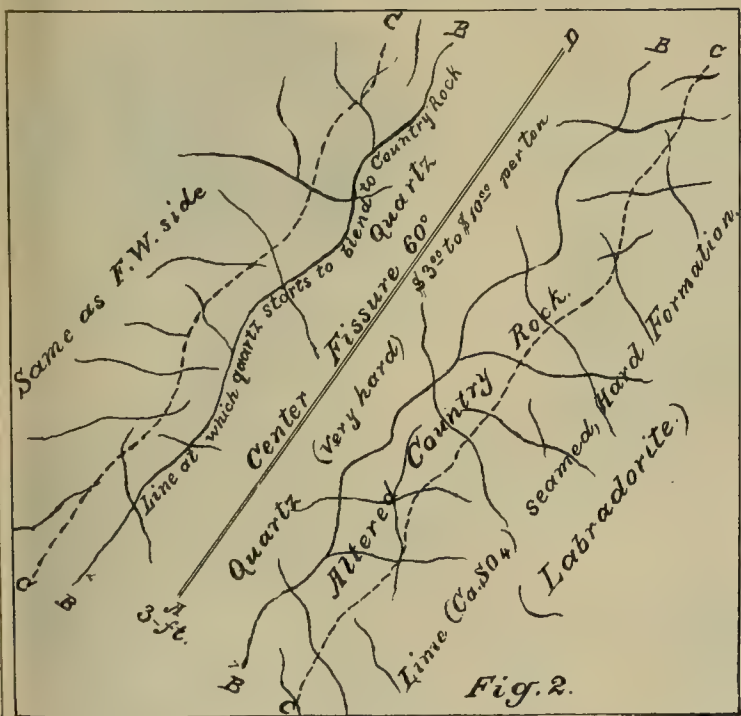
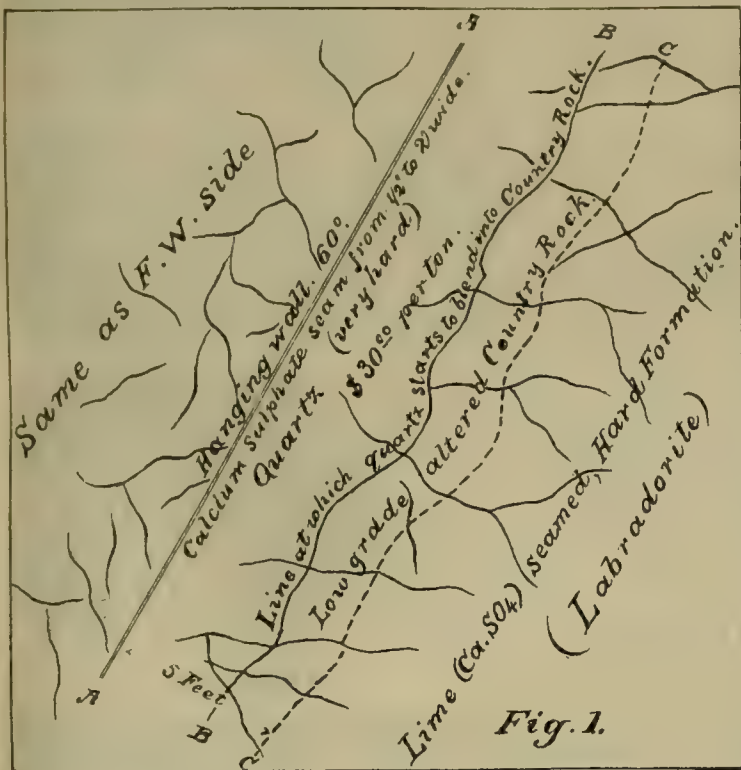
Where not powerful enough for this, or where the force was more or less parallel with dip or strike, the line of fracture would naturally be along the line of least resistance, which would be on the general line between the country rock and the ledge. There might be several hundred of these movements, some one way and some the other; but it would take but few to form the ordinary wall, as found in nature.

Where the edge of ledge matter was more or less uneven, the uneven edges of the country rock would be carried away and the abrasion of the quartz against the softer country rock would produce the smooth wall and the clay (ground-up country rock) gouge. In times of quiet this gouge could be acted on by new solutions and converted into a separate seam of ore, and thus various seams could be made in the aons gone by. Where the country rock and ledge matter are somewhat similar in hardness, the tendency would be to polish one or the other, or both, along the line of the wall fracture. I have a piece of quartz in my collection taken from next the hanging wall of a ledge. It is highly polished and lustrous.

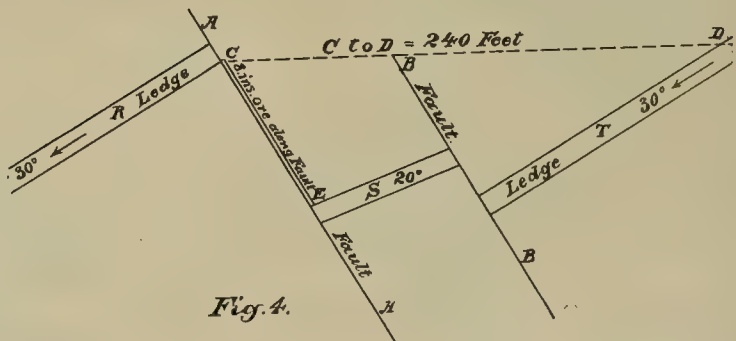
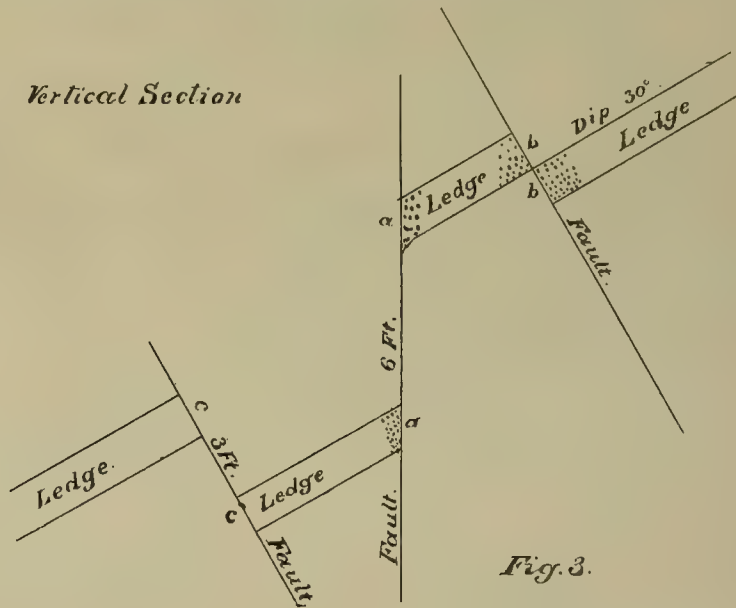
There was a thin clay gouge between this and the wall, and the wall itself was slick and smooth.

In the older formations, where the ledges are well defined and have both walls well developed, it might be hard to define the source or mode of formation; but in the Tertiary formations from observation I am led to believe all ledges are formed by the decomposition and replacement of the country rock by solutions moving along well-defined fissures (cracks). I never go into a mine without looking for the indications, and I nearly always find them. Take the case illustrated in Figs. 1 and 2. A, A is the original fissure, and in Fig. 1 is the hanging wall. In the fissure is found a seam of calcium sulphate from  $\frac{1}{2}$  inch to 2 inches thick. The hanging wall in Fig. 1 is smooth and has enough clay on it to show a mark when rubbed with the finger.

The gouge along the fissure is a hard white quartz, showing indications of lime ( $\text{CaSO}_4$ ), and cut at inter-



Vertical Section



have come under my own observation during my practical life, and so am constrained to raise a few questions, with the most courteous of intentions. From observation I am led to believe that most ledges are formed by replacement, by the action of the solutions flowing or seeping along fractures in the earth's surface, which we will call fissures; but these fissures in all cases, I am led to believe, are never of any considerable width, and, as a rule, consist of a crack, slip or fault, whose sides touch.

The solutions causing this replacement, decomposing the constituents of the country rock and replacing its minerals with other minerals and metals held in solution, may be either surface water or subterranean, or a mixture of both.

Sometimes the decomposition and replacement take place on one side only of the fissure, as shown in Fig. 1. At others the action takes place both ways,

One wall may be the original fissure, as shown in Fig. 1—the hanging wall.

Where the decomposition and replacement took place both ways, as was undoubtedly the case in the same character of rock, as a general rule the ledge matter remained as a mass, blending, more or less unevenly, gradually into country rock. When those cosmic movements and alterations mentioned by Mr. Alderson took place, due to the cooling of the earth's crust, lateral pressures, volcanic action, earthquakes, etc., these movements, upon reaching a ledge thus formed, naturally would follow the lines of least resistance, which would naturally be along the edges of the ore body, it being harder than the country rock.

At times, it is true, these movements were of such strength that the ledge itself was rent and faulted both with its dip and strike.

vals by the seams of calcium sulphate that radiate through the country rock, as shown. Receding from the wall, the indications of alterations gradually begin to appear in spots, many crystals of feldspar, replaced by silica, retaining their original form. This continues more markedly from the line B, B, where the country rock retains its characteristics, but is much silicified and carries but little value. At about the line C, C the action of the solutions ceased and the country rock shows no sign of silicification, and is much softer than the part between B, B and C, C.

From the hanging wall side (Fig. 1) no lime seams penetrate the ledge matter, but from the opposite side this happens frequently.

In Fig. 2 it is seen that the lime seams cut into the ledge matter from each way.

This ledge was much faulted and in the upper por-



tion (500-foot level to the surface) both walls were very much in evidence and the country rock, an andesite, very much decomposed and oxidized.

I deem it would be hard to harmonize the case described in Figs. 1 and 2 with the surface-stream deposition theory. In this ledge the upper decomposed section showed undoubted evidence of secondary crushing, redepositions of metals and recementations.

Sometimes the second cementation was effected by silica and at others by calcium sulphate.

In places the country rock was affected, and I have in my collection a piece of decomposed, oxidized country rock, apparently worthless, but parting it one sees a geode of quartz containing copper carbonate, much free gold and some black sulphides. It is a curious and valuable specimen, and a chapter on geology in itself.

If there are no secondary reactions in ledges, how can much of what I have said be accounted for, or how will we account for the local enrichment along the lines of some faults (a, a, b, b, Fig. 3), and none at all along others—C, C?

This drawing illustrates conditions in a ledge I once worked.

The dotted portions next to faults show concentrated gold values. In the same mine, along these faults, rich pockets were found containing free gold in placer shape and brecciated pieces of the original ledge carrying free gold, all cemented together by secondary depositions of calcium sulphate.

Prof. T. A. Rickard also calls attention to the local enrichment of ore bodies at the intersection of seams or faults in his article, "The Formation of Bonanzas in the Upper Portions of Gold Veins," presented at the Richmond meeting of the American Institute of Mining Engineers in February, 1901. If ledges are only formed by flowing streams on the surface of the earth, how will we account for ore seams found along faults—true faults, not supposed ones? I call to mind one, and illustrate it in Fig. 4.

The section R was faulted at C, and an adit run from the surface at that level had followed the fault for over 200 feet. The ore was cut off square at C and no further trace of the ledge could be found. Along the fault was a seam of quartz about 8 inches wide, carrying free gold at times, but its general characteristics were very different from those of the main ledge.

An upraise was started along the fault A, A above C, but no sign of ore was found above the upper edge of the main ledge, although the fault continued in that direction, as shown.

The seam C, E going down at right angles to the ledge was not worth working. A crosscut was run into the foot for over 100 feet, with no results, and that part of the mine was abandoned for about two years. Afterwards the writer, examining the ground, decided the country rock to belong to the hanging wall and continued the crosscut, contrary to every opinion, for over 90 feet farther, cutting the main ledge at D, in good ore. The horizontal distance between the two main fragments was 240 feet, and subsequent work developed the conditions shown in Fig. 4. There was an 8-inch seam of ore, carrying more or less gold, on the fault A, A between C and E, but it did not go above or below either fragment. Where does the river come in here? I call to mind a mine in the State of Chihuahua—a bonanza mine—in which the ore body, about 7 feet wide, lies between two more or less parallel seams—the foot and hanging walls—in an andesite formation. The fissures continue quite a distance each way, but the ore shoot is barely 60 feet long, horizontally. The gangue is a decomposed, altered andesite, highly impregnated with iron oxide, carrying from one and one-half to fifty ounces per ton in gold. The ore, besides, carries quite a quantity of sphalerite, though no gold is contained in the zinc.

Very little gold is seen with the naked eye, even in the richest of the rock. In this ore body there is no sign of replacement or original precipitation. It is simply an altered and decomposed, crushed country rock, saturated with gold-carrying solutions, from which the gold was precipitated by chemical action—which can be reasonably explained—in almost microscopical form in the multiple interstices of the rock.

So markedly is this the source of the gold that on the foot wall side samples taken 10 feet from the wall went \$8 per ton. How will the surface-stream formation theory account for this, or the conditions found in Cripple Creek, Colorado, particularly in the Gold Coin mine at Victor?

If ledges were ever formed in flowing streams on the surface of the earth they should be forming today, and we have no sign of such occurrence that I have heard of. I believe—and I believe that most every student of vein formation believes—that that natural phenomenon is going on as surely to-day as it ever was.

As stated, I am led to believe that ledges are formed by the coursing of solutions along fissures (cracks), mostly closed; and the idea suggests itself to me that that flow was not, and is not, necessarily in a stream, but may be the gradual seepage of the solutions from grain to grain, cell to cell and interstices to interstices.

In fact, this is the most reasonable supposition, and certainly would be the one most conducive to the

replacement and precipitation of minerals and metals. This is a slow process, to be true, but in nature a thousand years are as one day; but the results, nevertheless, are sure.

In regard to following ore shoots: Could there not be sinuosities in subterranean currents or lines of seepage, as suggested, as well as in surface streams? All currents certainly follow the lines of least resistance.

In making these assertions and comparisons I am speaking but for one, and he in nowise a "light" in the world on the subject treated. But the ideas here stated are the expression of my interpretation of the part of one of the leaves of Nature's great book.

What I have written has been actuated more from a desire to learn, by starting a discussion on so interesting a subject, than from any animus to criticize. Mr. Alderson certainly takes a radical stand, and one that many of us must study much before we can adopt it.

E. A. H. TAYS, C. and M. E.  
San Jose de Gracia, Sinaloa, Mexico.

## The Head of the Animas River, San Juan County, Colo.

[STAFF CORRESPONDENCE.]

A trip to Engineer mountain is full of interest. This prominent peak, rising to an altitude of 13,700 feet, forms part of the divide between San Juan and Hinsdale counties. It stands as a watershed to three streams. Its southwestern slope drains into the Uncompahgre that rushes down via Ouray; its southeastern slope faces the head of the Animas, while the basins on its northern side form the headwaters of Henson creek, that empties into Lake fork of the Gunnison at Lake City. Just east of Engineer, separated from it by a pass, are Mounts Seigel and Wood. On the northeast slope of the latter is Burroughs park, whose waters flow toward Lake San Cristoval, whose outlet is Lake fork. The southwestern slopes of Seigel and Wood drain into the Animas.

The watershed between the Animas and Uncompahgre is at the southern base of Engineer mountain, and is characterized by groups of small lakes, pools and springs. Just south of this saddle are Mineral hill and Mineral flats, and farther south is Tuttle peak.

Surface croppings and development clearly show a mineral belt trending through this section in a northeasterly and southwesterly course. It comprises four or five parallel fissures cutting through a porphyry formation. The belt, embracing these ledges is, approximately, 2 miles wide, and passes through Engineer mountain, Lake mountain, Mineral hill and Denver hill. It is claimed to be traceable to Hurricane peak and Bonita mountain on the southwest and to Henson creek on the northeast. Locations on Mineral hill, Mineral flats, Lake mountain and Engineer were made in 1878 to 1890. The Red Cloud, on Mineral hill and flats, comprising twenty-two claims, were doubtless among the earliest locations in San Juan county. In those early days—from 1878 to 1890—the village and postoffice of Mineral Point was a busy place, and 2 miles down the stream, at Animas Fork, were two or three small smelters and a mill. The following properties, all located within a mile of Mineral Point, were partially developed and for a time were shippers prior to 1890: San Juan Chief, Polar Star, Old Lout, Ben Butler, Red Cloud, Bill Young, Vermillion, Cacique, Maud S., Palmyra, Mammoth, British Queen, Engineer and Red Cross. Shipments from all these doubtless aggregated about \$1,000,000. The ore shipped, as a rule, was an iron sulphide, carrying possibly 7% to 10% iron, very siliceous, running high in silver, with some lead and zinc sulphide in places. Throughout nearly all these veins are also found gold values running from \$2 to \$6 to the ton. Much of the ore ran from twenty ounces to forty ounces silver.

Very little has been accomplished in the district within the last eight years. About that long ago T. F. Walsh, now owner of the Camp Bird, produced ore from the Ben Butler of the value of \$25,000, while he had that property leased. His values were silver, lead and gold.

Most of the development on the ledges that pass through this divide, between the Animas and Uncompahgre, was through shafts. As pointed out before, the surface here is covered with lakes and springs, and, as a consequence, it required vigorous and expensive pumping to keep the shafts and levels clear of water. This expense and difficulty was one of the great discouragers. The shafts generally range from 50 to 300 feet deep. The slump in the price of the silver was mainly instrumental in lessening work and stopping development then. The district is now coming into favor again. All holders now look closely after their taxes, titles and corner monuments. Within the last year or two many options have been given by parties desirous of grouping claims together; and the solution, possibly now in sight, is to drive deep crosscut tunnels for drainage and development and provide for concentrating the ore. There are suitable locations for such tunnels on both the Animas and Ouray sides. A little farther down the

stream sufficient water can doubtless be had for power and milling purposes.

L. B. Jackson, engineer and contractor of Chicago, Ill., has secured options and other control of forty-eight claims for parties in that city. The holdings he is endeavoring to group together include the San Juan Chief, Ben Butler, Red Cloud, Bill Young and others, which cover portions of the several parallel fissures and extending over both sides of the watershed. The work being planned is to drive a 2600-foot crosscut tunnel from a point below Denver hill, to take a northwesterly course through the latter hill, on through the Ben Butler to the San Juan Chief, cutting under the Butler at 600 feet depth. This tunnel would cut through Denver and Lake mountain, which really form a part of the watershed.

The Old Lout, located in Poughkeepsie basin, that drains into the Uncompahgre, was one of the biggest producers in earlier years. It is rumored that it and the adjoining Maid of the Mist have been acquired by A. E. Reynolds and others; and it is observed that Mr. Reynolds always gets properties for the purpose of working them.

The Polar Star is on the south side of Engineer mountain and is on the same fissure that passes through the San Juan Chief and others on Mineral flat. It has been well developed and belongs to Mr. Crooke and associates.

Park B. Beatty has charge of the work on the Uncompahgre Chief, which belongs to New York parties. It covers a portion of a vein between the San Juan Chief and that of the Butler. He ships an occasional car of ore and is developing further by a crosscut tunnel.

E. M. Brown, who has been a resident of Mineral Point district for twenty-six years, has had charge of the San Juan Chief for many years and has a number of locations of his own on the belt referred to.

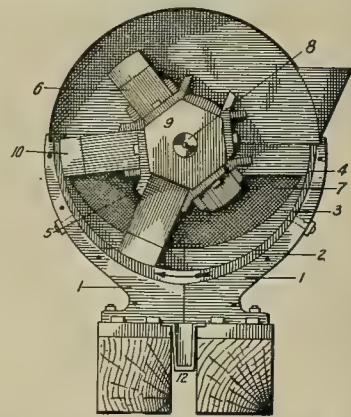
Denver hill has attracted unusual attention because of both vertical and blanket veins it contains in what many consider a phonolite formation.

As illustrative of the character of the ore in this section, two samples from the Ben Butler ran 18% and 21% zinc, 7% and 21% lead, .5% copper, 37 ounces and 59 ounces silver, .2 ounces and .3 ounces gold to the ton. They also showed 63% and 41% silica, 4.5% and 3.6% iron.

WASCOTT.  
Mineral Point, San Juan county, Colo., Sept. 15.

## The Wallace Mill.

The accompanying illustration presents a sectional view of the Wallace stamp and grinding mill, manufactured by the New Era Machinery Co., Denver, Colo. The crushing and grinding is done by three



stamps that operate inside of a mortar 40 inches in diameter. The stamps pass through apertures in the revolving yoke, shown in the center, and are sufficiently loose therein to permit them to slide either way as the yoke revolves. First one end of each stamp and then the other drops 12 to 14 inches on the ore and then grinds about 30 inches up the incline of the mortar before reaching the vertical to drop again. Thus, the three stamps make six drops to each revolution of the center yoke, with the grinding that follows each drop. The speed in operating is from twenty-four to twenty-six revolutions per minute, resulting in about 150 strokes per minute. The crushing capacity claimed for it is six to ten tons of ore every twenty-four hours, being equivalent to the capacity of a 5-stamp battery. It is stated that 4 H. P. will operate the mill.

Several of these mills are being operated in Colorado and are said to be doing satisfactory work. It is asserted that the grinding feature is advantageous in working partially free-milling ore, as the rusty particles of gold are brightened and prepared for amalgamation.

THE Royal Commission report of coal available in the coal fields of New Zealand says: "We feel it our duty to state in the plainest way that there is no unlimited coal supply in New Zealand, but that, so far as is known at present, the supply is comparatively small, and will be all wanted for the colony's requirements. Of course, there is a possibility that further research may find large deposits, but at present those deposits are not known, and should not be depended on."

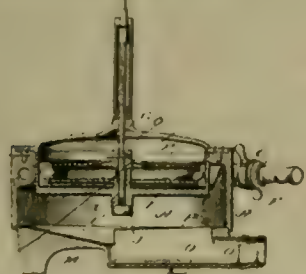


# Mining and Metallurgical Patents.

Patents Issued September 23, 1901.

Specially Prepared for the MINING AND SCIENTIFIC PRESS

IMPACT WATER MOTOR.—No. 682,664; W. Boekel and J. Boekel, Philadelphia, Pa.



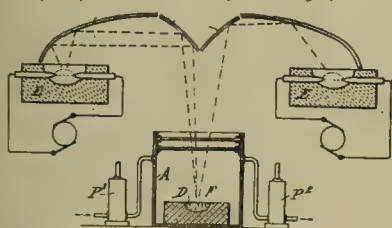
A water wheel and its spindle with a casing in three detachable sections, top section being provided with bearings for spindle and wheel which are removable with it, bottom section being provided with an outlet and middle section being provided with water-way which discharges through nozzles against periphery of wheel.

MEANS FOR CONVEYING POWER TO DREDGERS.—No. 683,063; W. O'Brien Jr., Waipori, New Zealand.



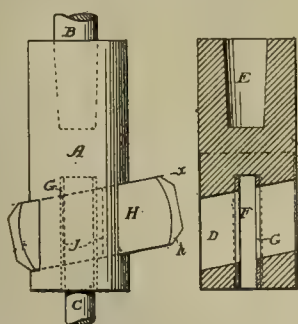
Pipe lengths pivoted together to fold in a horizontal plane, floats for sustaining pipes, pipe lengths being in different horizontal planes and having upwardly and downwardly extending ends to form the pivotal connection.

REDUCING OXIDES OR OTHER METALLIC COMPOUNDS.—No. 683,089; K. C. Wideen, Brooklyn, N. Y.



Extracting aluminum from its oxide by putting the oxide into a furnace, forming a vacuum in it, closing the same and submitting the oxides to a temperature greater than that of the oxyhydrogen blowpipe and which alone is sufficient to separate the oxygen.

ROCK DRILL CHUCK.—No. 683,127; F. Long, Footscray, Victoria.



A chuck having a bore for a bit shank, and a keyway through chuck inclined in relation to bore and communicating with chuck bore, a bit shank, and key for inclined keyway having an incision across inner face parallel with bore for bit shank and gradually deepening from inner face of key to a depth such that when deepest part of incision is beside bore

## The Sperry Vanning Buddle.

The Sperry vanning buddle, devised by a Denver man and manufactured by Hendrie & Bolthoff Mfg. & Supply Co., Denver, Colo., combines the motions of the revolving buddle and the vibrating vanner. The illustration herewith conveys a general idea of the



machine. Numerous tests are said to have shown efficiency in the treatment of the finer slimes. The combination motion, it is considered, gives it greater capacity than that of either the buddle or vanner applied singly; and the manufacturers claim that this increased capacity is no detriment to efficiency. It is claimed that in one test 1800 pounds were run per hour, equivalent to twenty-two tons per twenty-four hours, and it is believed fifteen tons per twenty-

four hours can be run as an average. Slimes worth \$2 per ton from a Black Hawk, Colo., mill were run at the rate of eighteen tons per day, making a 90% saving. Another test of tellurium ore from Boulder county, Colo., resulted in an 80.9% extraction; a test on lead carbonate ore in connection with hard porphyry showed 69.6% saving.

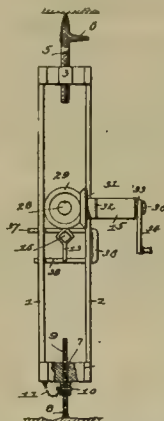
A lot of tailings from an Aspen concentrator

which carried 3% lead and 15% zinc, was tested and resulted in a product containing 46% lead, 10 5% zinc, being an effective separation. A general sample of the concentrate passed through a 200-mesh screen.

The pitch of the table, regulating the speed of flow, and the throw of the vanning motion, which is circular, can be readily changed as the character of the material may require.

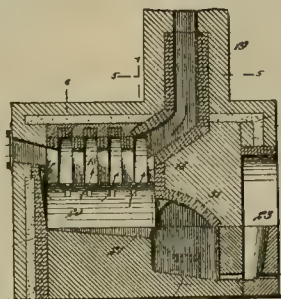
key does not project into bore and does not clamp bit shank, key however wedging bit shank when it is driven forward.

COAL OR ROCK DRILL.—No. 683,158; I. Wantling, Peoria, Ill.



A support of two standards connected top and bottom, each with apertures throughout its length, a feed nut of two hinged sections 12 and 20, section 12 provided with extended body 14 and depending body 13 and a yoke-pin for detachably securing feed nut in adjusted positions in frame, dovetailed threaded linings secured in sections and engaged by a thread-bar actuated through mechanism carried in extended body 14, a threaded spindle engaging connecting device at upper end of standards, and adjustable shoe 8 arranged with a series of apertures detachably fixed in lower connecting device of standards by a pin 10 slipped through aperture in support and corresponding aperture in shoe 8.

REDUCING FURNACE.—No. 683,375; C. Bishop, San Francisco, Cal.



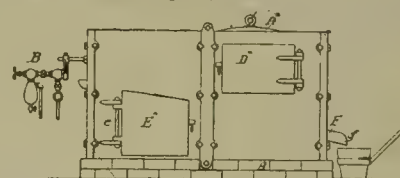
Fire boxes at opposite sides, a series of arched plates arranged in furnace and rearward of fire boxes, the plates being perforated, inclined runways below plates, a settling tank for receiving material from runways, and a bullion pot having connection with tank.

EXTRACTION OF PRECIOUS METALS FROM THEIR ORES.—No. 683,325; H. J. Phillips, London, England.

Subjecting the ore without roasting and in form of a powder—under heat and pressure—to action of alkaline polysulphides in solution of such weakness that same will have selective action, namely, will dissolve elements which are combined with gold and for which polysulphides have a greater affinity than for

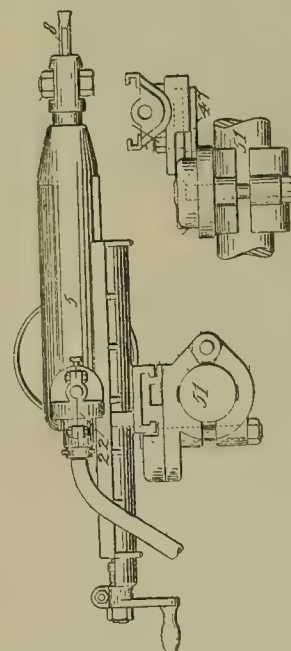
gold, without dissolving gold itself, which latter is thus dissociated and can then be recovered by any known suitable process for recovering free gold.

REVERBERATORY MELTING FURNACE.—No. 683,378; W. J. Brown, Philadelphia, Pa.



A melting pot built in furnace, a tap hole at bottom of melting pot, a spout communicating with tap hole, a combustion chamber back of melting pot and having an extension directly over melting pot, an inlet opening to combustion chamber, an oil burner directly in front of opening, down flues and return passing around melting pot, an oven with which return flues communicate, oven being situated directly under main portion of combustion chamber, a flue from oven to chimney, a flue from combustion chamber to chimney, a charging opening communicating with combustion chamber directly above fire pot, and a door closing opening.

ROCK DRILLING MACHINE.—No. 683,404; M. C. Jackson, Denver, Colo.



A guide shell and suitable drilling mechanism mounted thereon, a supporting bar, a clamp embracing bar, a plate bolted to clamp and provided with a slot extending parallel with bar, and a groove extending parallel with but larger than slot, a part mounted on guide shell and co-operating with plate, this part having an opening registering with slot of plate, and a bolt passing through slot and opening in co-operating part of guide shell, head of bolt engaging groove in plate, whereby as nut is loosened guide shell may be shifted in a line parallel with supporting bar without loosening clamp on bar or moving latter.



# MINING SUMMARY.

Specially compiled and reported for the  
MINING AND SCIENTIFIC PRESS.

## ALASKA.

### JUNEAU.

The Rodman Bay M. Co., G. Bent, Supt., is engaged in constructing a narrow gauge railway from the mine to the channel, a distance of 7 miles. The company is building the road for the purpose of being able to ship from and to the mine during the winter when the bay sometimes freezes.

### KETCHIKAN.

Supt. Mellen has shipped 150 tons of copper carbonate ore from Coppermount wharf. The Red Wing mine has also shipped 100 tons of rich copper ore from the same port. A shipment of gold-bearing ore from the Daco properties on Dall island has been made from Howcan.

## ARIZONA.

### COCHISE COUNTY.

B. Frankenberg and N. E. Ferguson, officers of the Pearl G. M. Co. of Bisbee, say of the mine near Bowie station that a tunnel has been driven 135 feet in ore all the way. In this tunnel one high-grade shoot of ore was struck 40 feet long and 20 inches wide, which assays \$80 in gold to the ton. The average of ore taken from one end of the tunnel to the other is from \$12 to \$15. P. Scannon is superintendent. The company will ship the ore to El Paso, Texas.

### GILA COUNTY.

W. H. Mercer and J. A. Valentine, who have bonds on twenty copper claims near Globe, have started a 1000-foot crosscut tunnel. They claim thirty-four leads showing on the surface which the tunnel is expected to cut.

W. H. Mercer, general manager for Crenshaw Bros., of New York and Richmond, Va., who have a bond on the Clipper mine, has let a contract for a 400-foot tunnel. Also, drifting from a winze sunk from the old tunnel, ore has been developed for a distance of 100 feet, which is claimed to average 6% in copper.

### MOHAVE COUNTY.

(Special Correspondence).—The new mill building at the Minnesota mine is up and the new machinery is being put in place with the expectation of beginning operations by November 1st. In the mine a number of men are doing development work and opening stopes. The vein is 2 feet wide, and carries high values in gold, silver and copper, and a considerable per cent of lead. The shaft is down over 300 feet. The owner of the mine, the Philadelphia & Arizona M. Co., propose to sink to 1500 feet. The company has developed a large flow of water in a well sunk to supply the concentrating plant.—J. M. Scratton, manager of the Elkhart mine, is sinking the main shaft toward the 1500-foot level. A short water supply is delaying the starting up of the concentrating plant, and prospecting for water is being done to increase the supply.—The Schuykill Co. are employing forty men. Work is being done on two shafts which it is said will be sunk 1000 feet without let-up. Both shafts are equipped with air compressors and drills, and each heading is advanced about 3 feet daily. Ore is coming out of both shafts.

Chloride, Ariz., Sept. 29.

The Gold Road mines, near Kingman, have been sold to people represented by G. Kislinsky of Los Angeles, Cal. E. Mellarky is foreman at the mine and will start development work at once. A gasoline hoist has been put on the mine.

### FINAL COUNTY.

The Oro-Cobre M. Co. has been incorporated, with office at Tempe, to operate the Goodwin gold claims, at Goldfield, and a copper mine situated near Globe, in Gila county. The latter mine has been bought from Mrs. A. Kinney and J. A. McCarthy and, it is claimed, carries high values in silver and copper. C. Hayden is president and F. M. Schureman secretary of the company.

The Boston-Arizona G. M. Co., located in the Amole district, near Tucson, is doing development work on a series of large veins. A number of surface openings have been made. The grade of ore developed is claimed to be above the average. H. C. Chapin is Supt.

### SANTA CRUZ COUNTY.

Wiley, Gee & Co. are adding new machinery to the reduction plant of the Pride of the West mine at Patagonia to increase the capacity to 100 tons of ore daily. The ore of the Pride of the West is copper, silver and lead.

The Alta mine is being put in repair by an Eastern company. Fifteen men are employed in cleaning out the old workings. The Alta was worked some twenty

years ago by J. K. Luttrell and associates. Supt. Hamill, who has charge, says it is the intention to sink deeper and then stope ore for shipment to the custom smelter at Patagonia.

The Bradford mines, located below Patagonia, which are being opened by Prof. Blake, have developed 10 feet of ore at 150 feet depth which gives an average of 8% to 12% copper ore. The mine is shipping 12% to 14% ore.

### YAVAPAI COUNTY.

The Leviathan G. M. Co. has been incorporated with capital \$3,000,000 by D. M. Purman, W. H. Battin and A. G. Hallett, to develop the Leviathan mine, near Stanton.

The Warrior Copper M. Co.'s double compartment shaft at the mine, near Dewey, is down over 110 feet, passing through small bodies of high-grade ore.

Work is progressing on the Home G. M. & Dev. Co.'s mine, in Weaver district, 6 miles east of Congress. Supt. Hanna says that the incline shaft is now down 60 feet and the ore is improving with depth. A whim has been installed on the shaft.

Luke Bros. have sold the Union mine, in the Pine Grove district, to W. J. Rainy and Detroit capitalists. It is reported, for \$50,000. On the claim a 500-foot shaft has been sunk, besides a large amount of tunneling. The buyers intend to erect a large mill at once.

## CALIFORNIA.

### AMADOR COUNTY.

The Central Eureka mine at Sutter Creek supplies its 20-stamp mill with ore, but Supt. W. R. Thomas is chiefly engaged in opening the mine and developing ore reserves. Next year will undoubtedly see a larger mill. The shaft is now near the 2000-foot level. The 1600-foot level is being pushed to a connection with the South Eureka workings.

At the Baloi, Supt. W. H. Storms is sinking the main shaft to the 1200-foot level. The shaft of a promising east vein is being sunk from 100 feet to 400 feet.

The company reopening the old Bunker Hill, with C. R. Downs as Supt., sinking the old shaft, which was 800 feet deep, to the 2000-foot level, are now down with it to 1250 feet. The old hoist in use is expected to take the shaft down to about 1400 feet. A new hoist will then be installed either this winter or next spring. Prospecting is being done on the 800-foot level, where there is a 100-foot belt of slate, thickly seamed with quartz, believed to indicate a large ore body farther along or deeper. The mine has no mill.

### CALAVERAS COUNTY.

The construction work at Robinson's Ferry of the Melones M. Co. is now in an advanced state toward completion. There are at present 110 men employed. The 60-stamp mill building is closed in and all work on the dam in the Stanislaus river completed. An order has been given for 783,000 feet of lumber to complete the 3.75 miles of flume, which is 8 feet wide by 4 feet deep. This flume, with 700 feet of tunnel and 500 feet of ditch, will convey the water from the dam to the mill. The water is carried across Coyote creek in a 6-foot wooden stave pipe. A small prospect mill and cyanide plant are kept at work testing the ores. In the 60-stamp mill there are two concentrator floors—the first floor with Hallet and Wiley tables, from which the pulp is carried to Frue vanners on the lower floor. In this mill will be used, for the first time in California, belt conveyors to carry ore from the bin to the rock breakers, from the breakers and grizzlies to a small upper bin, and from there through the mill, using a traveling tripper. A silver-plating plant will be installed. The sixty stamps are expected to start work by Jan. 1 next. Then work will be begun installing additional stamps. The mine has been opened up by 11,000 feet of tunnels, crosscuts, drifts, raises, winzes, and shafts, and over \$200,000 has been expended in this development work alone. The main tunnel is 4200 feet long, 8 feet in height by 9 feet in width. Electric locomotives will have 5-ton ore cars. The tunnel is connected by upraises and shafts with the surface on this side of the hill, and opens up on the mine to a depth of 1100 feet from the surface. W. C. Kallston is manager.

Eight men are employed at the Eudora mine, at West Point. In the tunnel a ledge 3 feet wide prospects well. About fifty to sixty tons of ore are being shipped to Selby to be smelted. A stamp mill may be erected after more complete development.

At Fritzell & Evans drift mine on Rancheria creek, near Rancheria, the buildings are completed and the roller mill is nearly finished. The gravel is cemented and has to be crushed. Fifteen men are employed at present in digging ditches and preparing to lay pipe.

At the Kaukaee quartz mine, near Defender, owned by J. B. Dille, a tunnel is in

about 120 feet, but has not reached the ledge yet.

### EL DORADO COUNTY.

The Lagrave mine, near Greenwood, will soon install a new boiler and a larger hoisting engine.

### NEVADA COUNTY.

H. Diener has a bond on the Grey Eagle mine, at Maybert, and expects San Francisco people, who recently examined the mine, to buy it and begin active work soon. It is also planned to erect a 10-stamp mill.

At the Red Cross mine, Omega, two Huntington mills are kept running, and seventy-five tons of ore are crushed daily. At a depth of 150 feet the ledge shows well in free gold. The company is headed by J. A. Brent.

Under the direction of Supt. B. Hoskins work has been commenced on the Eclipse mine at Gold Flat, near Nevada City, and the shaft will be put down to the 600-foot level.

Supt. W. W. Kirkham of the La Suerte mine and Secy. L. A. Rose have bonded the Osceola mine, near Nevada City. There is a tunnel on the property, in which a large ledge is exposed.

H. A. Fairbanks, superintendent of the Keystone mine at Nevada City, reports good ore in the 200-foot level. It is the intention of Mr. Fairbanks to sink another 100 feet before doing stoping.

The Grass Valley Exploration Co. will start up the old Kate Hays quartz mine at Grass Valley. A 30 H. P. steam hoist and the buildings have been constructed and the shaft is to be continued downward. The Crescent mine is to be worked by the company through this shaft.

### PLUMAS COUNTY.

M. Olsen of Nelson Point has discovered a quartz ledge on Dixon creek which is from 7 to 12 feet wide, carrying gold and copper.

### SHASTA COUNTY.

The Archer gold quartz mine, on the South Fork of Clear creek, owned by F. M. Archer of Redding, is reported to have been sold to San Francisco people. Some development work has been done on it.

### SISKIYOU COUNTY.

Several prospects of copper have been found lately in the Joe Creek country, north of Happy Camp.

A Detroit claim has bonded the New Pine claim, at Oak Bar, Klamath river, to which a large ditch 1½ miles long is being built, to operate a hydraulic elevator plant.

A. C. Brokaw, who is operating the Campbell hydraulic mine in Quartz Valley, near Oro Fino, has found a quartz ledge in the same locality. He is putting up a mill.

Prospecting is carried on steadily in the Fool's Paradise district, Yreka P. O., on the lower end of Shasta river, with very good results, rich nuggets being discovered occasionally.

### TRINITY COUNTY.

(Special Correspondence).—The Snow Gulch claims have been bought by C. F. Rose, S. C. Willmott and F. Fletcher. These claims contain rich gravel, but it has been a difficult problem to get water on them. It is now found practicable to get the water, and the buyers will prospect the ground this fall, preparatory to building the ditch and pipe lines next year.—The Northern Headlight M. & M. Co. have completed their new plant and are about ready to resume operations. F. Fletcher is manager.—The Golden Jubilee is making additions to its plant. Carrville, Sept. 9.

### TULUMNE COUNTY.

C. E. Dedrick of Carters has bonded the Black Bart and Dorsey mines, on the main Stanislaus, in the neighborhood of the Star mine.

Supt. J. W. White states that erecting a hoist, putting in a compressor and straightening and retimbering the old shaft at the Porto Fino mine, at Sonora, has been finished and sinking recommenced. It is the intention to sink to a depth of 225 feet, and thence crosscut about 300 feet to tap another vein.

## COLORADO.

For August the net earnings of the United States Red. & Ref. Co. are reported to have amounted to \$65,000, or at the rate of \$780,000 per annum. This is equal to fixed charges of \$180,000, sinking fund requirements of \$50,000, a dividend of 6% on \$4,000,000 preferred stock and a balance of \$310,000, or 5% on the common stock. Only two of the plants of the company have been running—the Colorado Philadelphia and Standard Works at Colorado City. It is expected that the Union, Metallic and National, at Florence, will be all running before Dec. 1.

### BOULDER COUNTY.

An Iowa company is arranging for the immediate development of the Columbia

mine, at Magnolia, which they will operate under a bond. The mill will have a capacity of fifty tons a day. J. H. Kemp is Supt. of the mill, and O. S. Blakeslee, late of Middletown, Conn., is Asst. Supt. and electrician.

T. Williamson of Gold Hill says many old mines at that place are being reopened, unwaters and producing pay ore. The White Cloud mine, which was closed twenty-seven years ago, now reopened, shows 2½ feet of ore at the 80-foot level which runs \$12 to \$15 per ton.

### CHAFFEE COUNTY.

The mining camp of Turret has three shipping mines. The Vivandiere mine is said to be in bonanza. A Cripple Creek company has secured about thirty claims and has begun work.—The Bancroft M. Co. has completed buildings on its Anaconda mine.

### DOLORES COUNTY.

Work on the Pro Patria Co.'s concentrating plant is well advanced. Grading and laying the foundation for the mill and placing of the heavier timbers is completed. W. J. Scoutt is Supt.

### FREMONT COUNTY.

The Smoky City-Colorado M. Co. of Pittsburg, Kas., and Colorado Springs, will sink its double-compartment shaft at Dawson, near Canyon City, to a total depth of 500 feet, the present depth being 50 feet. A body of concentrating ore has been struck and will be opened. The ore will be treated at the Union concentrating plant, recently installed on the Copper King group and used jointly by the several shipping mines of that locality. It has a capacity of 50 tons at present, but will be increased to 200 tons. The ores of Dawson carry gold and copper values. A. K. Lanyon of Pittsburg, Kas., is president of the company and A. C. Paterson general manager.

### GILPIN COUNTY.

The Ingalls G. M. Co. has been incorporated, under the laws of Wyoming, by Cripple Creek and Denver men, to operate in this county, with office in Denver; C. C. Griffin, W. R. Benzie, L. E. Drake, J. M. Shroter and J. E. Hunter are the directors.

### LAKE COUNTY.

The old Printer Boy mine is to be reopened by a new company organized by J. M. Childs of Leadville. P. Ayres is president, J. M. Childs vice-president and general manager and W. W. Detrick secretary and treasurer of the company, with offices in New York City. The shaft and power buildings at the mine are in course of construction and operations will be commenced very soon. It is the intention of the present company to sink to the second contact.

The smelters have reduced the ore output of Leadville over 500 tons a day according to the statement of some of the mine operators. The way they do it is to notify mines that after a certain date only a certain number of tons daily will be accepted. Some mines have been forced to curtail their output over one-half and others over one-third. The small mine suffers more than the large property, and some of these have been forced to shut down entirely. The Smelter Trust claims that it cannot keep up the price of lead unless it can control the output and that right now it is necessary to shut off production to a certain extent.

The shipments of manganese ore from Leadville to the Chicago Steel Works have increased and now amount to over 200 tons daily, of which 125 tons comes from the Caribou mine. The average value of the manganese ore to the miner is \$2.50 to \$3 per ton f. o. b. Leadville. The Phoenix M. Co. is shipping fifty tons to the Colorado Fuel & Iron Co.

C. Stevenson of Pittsburg, Pa., is preparing to start operations on the Rex shaft in Iowa gulch, at Leadville, for the Keystone M. Co. Its property comprises sixty-five acres and ore has been struck by a diamond drill. A large plant of machinery, including a heavy pump, is to be installed.

### OURAY COUNTY.

The Home Pyritic Smelting Co.'s plant blew in Sept. 27 for the winter's run. There are 1200 tons of ore in stock to start on.

The Governor M. Co. has been incorporated, under the laws of Wyoming, by A. Zang of Denver and W. R. Kramer and P. A. Heibler of Ouray, with \$150,000 capital. The principal office is in Cheyenne, with a branch in Denver. The property of the company is the Governor mine, located in the Sneffles district, near Ouray.

### PITKIN COUNTY.

(Special Correspondence).—The Smugler is mining two classes of ore that are milled separately. The first is a heavy lead-silver ore in a spar gangue and the second has about the same percentage of lead and silver, but with zinc added. The two classes come from different stopes from the 900-foot level up. The spar lead



ore is treated at the old mill, where a coarse jig product and a finer table product are made. The lead-zinc ores are handled by the new mill, which makes a lead table product and a zinc middling, though the lead concentrate carries some zinc, but the latter is kept below 10%, and when thus it is not counted a detriment at the smelter. In the new mill are two sets of tables, those on the upper floor, which make a lead concentrate and send zinc middlings to six other tables, which are on the lower floor. The latter make a still closer separation of lead from the zinc. The zinc concentrates, which carry some silver, are being held. The zinc ores here are not a sulphide, but a carbonate, the latter being of greater specific gravity than the former, making separation from lead more difficult. The percentage of iron in them is small, however.

The old mill runs about 160 tons of ore in each day of ten hours and forty minutes, making about forty tons of concentrate that will average about 27% lead and twenty-seven ounces silver. The new mill runs about 110 tons of ore in twenty-four hours, divided into three eight-hour shifts, the product of which is about fourteen tons of lead concentrate that averages about 52% lead, seventy-eight ounces silver and 9% zinc. David Cole has charge of the two mills.

Aspen, Sept. 28.

#### SAN JUAN COUNTY.

(Special Correspondence).—The Natalie M. & M. Co. and Occidental M. Co. own contiguous grounds, extending from the north fork of Cement creek northward, covering portions of Sampson and Los mountains. F. J. Hurley of New York City is president of both companies and the operations on the two properties are unified. A power plant, comprising steam boilers and a Rand 14-drill air compressor, with dynamos for electric light, have been installed in North Fork basin. At this point is the entrance to the Hurley tunnel, now in 830 feet. It takes a north-easterly course and is designed to cut through Sampson and into Los mountain, a distance of about 5000 feet, cutting 2500 feet below the apex of the latter. The old Occidental workings, on Sampson mountain, amount to about 2000 feet, where there is an enormous tonnage of low-grade ore on the dump. The Hurley tunnel will cut 500 feet below these old workings and will crosscut a number of veins in its course that outcrop at the surface. The ores of the group are an iron and copper sulphide, with principal values in gold and silver. It is considered a concentrating proposition. James Lewis is Supt.

WASCOTT.

Gladstone, Sept. 24.

#### SAN MIGUEL COUNTY.

The old Badger mine, on Silver mountain, closed for a number of years, has been bought by A. T. Hathaway, who has let a contract to W. J. Scoutt to drive 1000 feet on the Hathaway tunnel. The tunnel is now in 850 feet.

Ten years ago the Lewis mine, near Telluride, was sold for taxes to N. Mansfield, G. Rohwer and C. F. Painter of Telluride. Recently Mr. Rohwer picked a sample sack of rock from the old dump to make a test. After concentrating it down four into one, the concentrates yielded \$30 a ton. The ore seems a good concentrating proposition, yielding a product carrying nearly 40% lead. There are several thousand tons in the dump, and it is the purpose to treat it next season. It is possible a small plant will be built at or near the dump.

#### TELLER COUNTY.

The Elkton Con. M. & M. Co. has contracted for the installation of another boiler of 250 H. P. capacity. With the three other boilers in use, the addition will bring the total up to 1000 H. P.

The Granite mine, near the top of Battle mountain, Cripple Creek, with its machinery, has been idle for several months. There has recently been a proposition among the owners to start up again. On the 900-foot level a shoot had been opened for 80 or 100 feet that would sort out five ounces in gold to the ton, leaving a large proportion that runs \$40. At the time of the suspension it was declared that a sale was on.

Machine drills have been taken out of the ore shoots on all levels of the Last Dollar, where stoping was in progress, it having been found that the waste with which the ore was necessarily mixed in the use of machines reduced the general value of the rock too materially for sufficient profit. The shoot measures 2 feet in width and the machine broke 4 feet.

Contractors on the Rose Nicol have abandoned work at 450 feet on the crosscut for the second time. Eight dollars a foot did not pay them on striking a hard dyke, and after the rate was raised to \$12 the dyke became harder and still unprofitable.

John Hays Hammond makes the following statement relative to operations on the

Independence, at Victor: "During August there were hoisted from the mine 21,000 tons of rock, and the gross shipments amounted to 8000 tons of ore, with net profit of \$190,000." This was an exceptional month, and the gross tonnage was made with a view of paying the expenses of the new machinery that will shortly be installed and to prepare the property for the output of a larger tonnage of lower grade ore that the increased hoisting capacity will permit.

#### IDAHO.

The table shows the tonnage output of Cœur d'Alene lead-silver mines—first-class ore and concentrates—for the first six months of 1900 and 1901. Valued at \$65 a ton, the total product for the first half of 1901 has a valuation of \$5,436,580. The product of the district's gold mines for the same period is estimated at \$250,000. Tons shipped:

| 1900.               | 1901.               |
|---------------------|---------------------|
| January.....13,526  | January.....16,015  |
| February.....11,052 | February.....13,991 |
| March.....12,994    | March.....17,593    |
| April.....12,695    | April.....13,258    |
| May.....12,421      | May.....12,314      |
| June.....12,374     | June.....10,621     |
| Total.....76,972    | Total.....83,792    |

#### BLAINE COUNTY.

A Mr. Clark has made a strike on Rock creek, west of Hailey, locating a ledge of gold ore from 3 to 5 feet that assays over \$37 per ton.

#### BOISE COUNTY.

At the Washington mine, at Idaho City, sinking to the 600 level has been begun. The mine is equipped with a 5-stamp mill. It is understood that the work to be done during the winter will be running an incline from the bottom of the shaft 300 feet down, following the vein. Later the vertical shaft will be continued on down to the same level and a crosscut run to the ledge. C. Balbach is manager. It is stated that the mill will be started on ore coming from the new development.

The Homestake & Mountaineer M. & M. Co., of Neal, will use the Pneumatic cyanide process in their mill. Chas. Balbach is manager.

#### IDAHO COUNTY.

E. H. Dewey of Nampa, of the Thunder Mountain mine, says that they have drifted 559 feet on the deposit and crosscut it 200 feet without a sign of the limits of the ore body being reached in any direction. The work has attained a depth of 79 feet. The grade of the ore, he says, is improving with depth, and at the last report was running from \$15 to \$20 a ton in every face. The mill, he said, would start on \$15 ore and would treat seventy tons daily.

C. W. Whitcomb of Boston, manager of the Boston & Seven Devils C. Co., states that the company has made shipments this year of ore giving smelter returns averaging 30% copper, \$4 gold and \$2 silver. In extracting this ore something over 10,000 tons of 12% material has been mined and is now on the dump awaiting reduction in the smelter building at Weiser. He says it has been determined to make the plant 180 tons daily capacity, instead of 100 tons as at first planned.

J. N. Stacy, president of the Oro Grande G. Co., operating at Elk City, says that development to date shows 12 to 20-inch vein of free-milling quartz, with average value of over \$100 per ton. A wagon road has been built to the mine and the work will be continued through the winter. A stamp mill will be projected next season.

The Alamance M. Co. of San Francisco has its new 20-ton stamp mill, at Elk City, in operation. Twenty-five men are employed on this property. The ore is free milling.

T. Connolly has located at Newsome Creek a free milling 16-inch ledge which runs up to \$100 a ton in value. An arrastra, capacity two tons daily, is in operation.

The French Creek Co. at Pierce City is running a 5-stamp mill and a sawmill. This company owns thirty-four claims and reports a rich strike on one of them.

#### OWYHEE COUNTY.

Machinery is now being taken from Flint for the construction of a 5-stamp concentrating mill at the White Bros. mines at Silver City.

Leonard & Grete, drifting north from their tunnel on their Banner claim, at Silver City, have cut a shoot of high-grade ore. The vein is 8 feet wide. It is claimed that the ledge samples \$30 a ton.

The tunnel under War Eagle mountain is now in about 5050 feet. It is reported that a 17-foot ledge has been cut, but no prospecting done on it other than cutting through it. The vein is slightly mineralized at the point of crosscut. The tunnel was driven 300 feet in August, and an average of 10 feet per day has been maintained since.

#### MONTANA.

##### HAVERHEAD COUNTY.

Developing the Indian Queen copper claim, near Dillon, is progressing under the supervision of S. J. Dennis, who has a bond on the mine at, it is said, \$50,000, from J. Annear and associates of Walkerville. In addition to copper the ore carries some gold.

G. B. Conway and C. M. Stolle have leased the Iron Mountain mine at Argenta. It has a large quantity of low-grade ore exposed, and it is reported that the smelter will be started up to work these ores.

##### FERGUS COUNTY.

The work of treating the ore of the King-Barnes mine at Kendall has commenced and the cyanide mill has been started up at full capacity. The plant now consists of a No. 5 Gates crusher and two sets of gates rolls, with a 75 H. P. Atlas engine. The daily capacity of the mill is 125 tons, and this can be increased to 200 tons. The tank room is 130x28 feet and contains five tanks, each with a capacity of 125 tons. The main body of ore is directly above the town of Kendall. A working tunnel has been constructed, 300 feet, which runs directly underneath the ore body, and the ore will be stoped into chutes, from which the cars will be loaded, and thence taken to the mill, one-fourth mile distant, by horse power. H. Shaw is superintendent.

##### FLATHEAD COUNTY.

(Special Correspondence).—Cabinet is the name of the new postoffice established in the West Fisher district at what used to be called the Forks of the Road, where a townsite is being cleared and surveyed. The West Fisher district is a lively place, with both stamp and sawmills going. In the A. K. M. & M. Co., better known as the Beager mine, a shoot of ore has been struck which shows coarse gold. This mine will be the first in the camp equipped with an electrical plant for lighting and drilling. The mill is run by water power. W. J. Beager is manager of this property. The new Mother Lode mill, near the Beager mill, is planned to be an exact duplicate of it. The machinery for the Mother Lode will be put in this winter.

J. L. Scarlett, owner of the Cedar group, is doing development work and hopes to get to the producing stage by next spring. Greenwell & Vaughan's big placer mine is understood to be sold for about \$200,000. A large hydraulic plant is to be installed.

F. T. PRESLEY.

Libby, Sept. 21.

##### GRANITE COUNTY.

The Howard Copper Co. has been incorporated to develop some late copper discoveries near Phillipsburg; it is a South Dakota organization, with head office in New York. The company owns the Tiger's Eye and Bush lode mining claims. J. Neu of Phillipsburg is the resident agent, L. U. Loomis president and J. C. Howard secretary.

At the Howard Copper Co.'s mine, near Phillipsburg, the upper workings are reported to show a pay streak with 12% copper in a ledge 10 feet wide.

##### LEWIS AND CLARKE COUNTY.

The Superior & Montana Dev. Co. has begun the development of the mines of the Gold Belt M. Co., at Empire, with S. H. Brady of Houghton, Mich., Supt. Ore has during the old management been extracted from the Empire, Smithville and Bell Boy veins, but the most work has been done on the Empire, on which tunnels have been run to a depth of 460 feet. The Empire mine has a 60-stamp mill, a hoist on the Bell Boy and two air compressors.

A tunnel driven about 700 feet into the Christina mine, owned by R. A. Bell of Helena, has a vein said to be about 48 feet wide of iron and copper ore. Mr. Bell says the ore in the tunnel carries twelve to fourteen ounces of silver, a little gold, 1% to 2% copper and 30% iron, while there are pockets which carry higher values in both gold and silver. This ore he believes to be only the iron cap to a copper vein, which he expects to strike by going down on it until below the water level.

##### JEFFERSON COUNTY.

The Colorado M. & Dev. Co., operating the Hidden Treasure mine near Corbin, is installing machinery.

##### MADISON COUNTY.

F. Johnson has bought a half interest in the Occidental, Tamarack and Uncle Sam mines from T. Stewart of Brandon. The owners propose to commence work on the claims at once.

##### MISSOULA COUNTY.

W. P. Ketcham, Supt. of the Copper Bell M. Co. mine, near Clinton, states that Manager Scheffer of Milwaukee was expected at Clinton, at which time arrangements would be perfected for the commencement of extensive development work on the company's prospects.

The Vermilion placer mine, on Ver-

million creek, has been sold by T. Rodda, A. D. Dorn and J. P. Anderson of Butte, for, it is said, \$50,000. It is a hydraulic proposition and will be worked next year.

C. Dodge of DeBorgia says the most extensive work now being done at that place is by the Deer Creek M. Co., of which D. Cromie is Supt. It has installed a steam 10-stamp mill at its mine, 7 miles from DeBorgia station. Tests of the ore that have been made are said to show up favorably. Ore is now being taken from the mine through a 500-foot tunnel.

##### ONTONAGON COUNTY.

G. E. Perkins has shipped several hundred pounds of rock from the Carp Lake property to Providence, R. I., for treatment. The shipment, it is said, will run one-quarter ingot copper. The shipment is made for testing methods of separating the copper from the rock, which is a sandstone.

##### SWEET GRASS COUNTY.

The Deer Creek M. & D. Co. claim to have made a new strike on the Weaver-Dickson claim, at Big Timber. The ore is a steel galena and the assays show \$70 to the ton.

##### NEVADA.

##### ELKO COUNTY.

The Grand Prize mine, at Tuscarora, is to be reopened and worked again, a company having been organized for that purpose. Work was suspended on account of inflow of water. With improved pumping machinery, it is expected to keep the mine clear.

##### NYE COUNTY.

J. F. Anderson, president of the Tonopah M. Co., states that Manager J. H. Jenkins has made arrangements for machinery and supplies to open the mines as soon as the leases fall in. A 12-mile pipe line will be laid from a point in Ralston valley, near Rye Patch, to Tonopah to provide a water supply for the camp. The water will be pumped up 700 feet to a reservoir, from which the water will have a pressure head in case of fire.

##### WASHOE COUNTY.

The Trimetallic and W. M. Teller mines, owned by A. D. Griffin and situated in the Antelope range, 20 miles north of Reno, have been bonded to a Philadelphia company.

The shaft at the Forlorn Hope mine, in Olinghouse, is down 214 feet. The ledge is over 5 feet wide and the pay streak, it is said, 2 feet wide. The pay ore goes from \$225 to \$250 per ton in gold. The Forlorn Hope has the deepest shaft at Olinghouse and the ledge continues below the water level, found at a depth of about 197 feet.

R. B. Hawcroft, A. J. Taylor, D. Finlayson and E. J. Eddards have bonded to an Eastern company three claims near Reno at \$15,000. The claims are the Buster, Blue Star and Gulch. It is expected that work will begin immediately.

##### WHITE PINE COUNTY.

The Butterfield G. M. & M. Co., a Maine corporation, with office in Boston, is installing a stamp mill at Osceola, having recently bought mines of the Nevada G. D. Co.

##### NEW MEXICO.

##### BERNALILLO COUNTY.

The Jura-Trias Co. has completed its copper smelter at Senorita. The company has also been operating its own sawmill close to the smelter. The company is mining its own coal from a 14-foot vein. Limestone and iron for flux are near at hand. The ore, it is claimed, ranges from 10% upward in copper.

##### COLFAX COUNTY.

A number of mines at Elizabethtown are making preparations to work their ores at the mines. The big dredger is working successfully on the auriferous gravel of Moreno valley.—The Smithfield Co. of Pittsburg, Pa., of which F. Spurr is the manager, has put in an 80 H. P. boiler for the hoisting works on the Bobtail mine, situated at the head of Grouse gulch.—O. F. Matkin, Supt. of the Legal Tender mine, is working on a tunnel driven to tap the shaft. When this is done the company expects to put in heavy hoisting works.

The tunnel of the Legal Tender mine at Elizabethtown is being driven to intercept the shaft. After the connection is made heavy hoisting machinery will be put in.

The Smithfield Co., of Pittsburg, Pa., for whom Frank Spurr is manager, has put in an 80 H. P. boiler for the hoisting works at the Bobtail mine, near Elizabethtown.

##### GRANT COUNTY.

The Modoc M. Co., operating the Modoc mine, at Organ, is constructing a boarding house and other mine buildings. Work is also to be commenced on a large mill.

The Pacific Union Smelting Co. of San Francisco are putting in a 50-ton furnace at Lordsburg and propose to be ready to



receive ores by Nov. 1, and the Lena M. & M. Co. are putting in a 25-ton furnace and a 150-ton concentrator and propose to be ready to start up about the same time.

The vein struck in the level being run from the bottom of the Manila shaft at Aberdeen assays 11% copper, 3 1/2 ounces silver and \$1 gold.

The buildings under construction by the Cochiti G. M. Co. at Albemarle for the compressor plant are almost completed and the machinery placed in position.

#### SANTA FE COUNTY.

The smelter of the Santa Fe G. & C. Co. of San Pedro has closed down for repairs. It is stated by the manager that it will resume after a general clean-up.

A core drill with 2000 feet of piping has been placed on the Copper King at Red River. The company sunk a shaft which filled with water, and this drill will be used to locate the ore vein.

#### OREGON.

##### BAKER COUNTY.

A strike of copper ore is reported from the Baisley-Elkhorn mountains, near Baker City, made by T. Hunsaker. The ledge on the surface was about 100 feet wide. On sinking a shaft it passed through soft, decomposed vein stuff, which gave some values in gold, silver and copper. At a depth of 60 feet it struck a large body of copper ore which carries high copper values. A crosscut for 12 feet on both sides of the bottom of the shaft is in ore.

The four claims owned by Burns, Monades & Parker in the Buckeye district, near Baker City, have been bonded to Eastern men at \$60,000. The ledge is about 150 feet wide on the surface and the ore values are said to average \$8 to the ton in copper and gold. It is a sinking proposition and machinery will be installed.

The Gem G. M. Co., in which W. L. Vinson and Geiser Bros. are the principal shareholders, is doing extensive development work on the Gem mine, near Sparta. The machinery for a 10-stamp mill is on the ground, and construction is going on under the direction of B. L. McLain. A large hoist for deep sinking is in place, and started up. Thirty men are employed.

The Brazos mine, consisting of several claims in the Virtue district, formerly owned by the Blewetts of Nebraska, and afterwards bought into by A. Geiser of Baker City, has been sold by the latter to W. E. Miller and W. P. Young of The Dalles for \$40,000.

##### GRANT COUNTY.

W. A. Gilliam and I. E. Rose of Granite have discovered and located what they believe to be an extension of the Morris mine in the Greenhorn mountains. The ledge is 13 feet wide and assays \$7.50 per ton on the surface, some of the ore going as high as \$9 to the ton.

##### JACKSON COUNTY.

The Rogue River Q. M. Co. of Medford have five cinnabar claims in Meadows district. A shaft sunk about 10 feet on what was supposed to be a "crossing" on the Mayfield claim has developed a very rich "chimney" of ore, the rock being quite a pure cinnabar. The company claims to have taken \$4000 worth of ore from this 10-foot hole, and has about 2 feet of ore of remarkably high grade to sink on.

The Shorty Hope M. & M. Co. of Jacksonville has been incorporated with capital stock \$1,000,000, to engage in a general mining and milling business, by H. S. Sanford, D. F. Fox and E. A. Sherwin, all of Ashland.

##### JOSEPHINE COUNTY.

The sale of the Golden Standard mine, on Galls creek, by K. K. Kubli, H. D. Kubli, Mrs. E. J. Kubli of Jacksonville and E. B. Watson of Portland to E. W. Forbes & Co. of Seattle, Wash., has been made for \$37,500. The new owners propose to erect a new stamp mill on the property at once.

The Hull & Beck placer mines and a quartz claim on Louse creek have been sold to J. O. Booth of Grants Pass for \$9000. The mine is said to have a well-equipped plant with water for an eight months' run and has been operated since 1888.

##### MALHEUR COUNTY.

Petroleum has been discovered near Vale. Three sections of land have been located by Albrecht & Cowgill for Spokane and Portland parties. It is the plan of the new Baker City syndicate to move a boring apparatus from southern California to the new field in the near future and sink wells in a number of places. An expert has declared that the fossiliferous rock in this oil basin is a natural cement of high grade and that the land is valuable for the cement alone.

T. D. Wilson of Denver, Colo., is re-

ported to have made a test of the surface ground in Big Bend district, near Ontario, putting down a number of test pits about 12 feet deep, to water level. The tests indicated values of about \$1.70 per ton. A plant to work twenty-five tons of the surface gravel daily is projected.

#### SOUTH DAKOTA.

##### LAWRENCE COUNTY.

The Wasp No. 2 Co. claims that it is making money on ore that runs as low as \$4.50 per ton, the cyanide process being used exclusively in the treatment. The 50-ton plant is at Lead, and the ore treated is a quartzite, which rests upon the slates.

The Two Johns M. Co. will install a diamond drill at their mine in Crown Hill district, near Lead, to explore for ore in the quartzite. The mine is owned by C. A. Hallan and associates of Chicago.

The main ledge of ore in the Grizzly Bear mine, near Hill City, has been found. This mine is owned by the Lakota M. Co., L. G. Linn of Denver, Colo., president. The 20-stamp mill will soon be started up.

The ore from the lower workings of the Black Hills Copper Co., Rochford, has improved in value. The incline shaft at the 600-foot level has entered ore that carries about 2% copper and \$4 gold. The company is figuring on the erection of a smelter.

Lead people have organized the Potsdam M. Co., intending to work over old dumps in the Ragged Top district with cyanide process. Tanks have been installed and the plant is ready for work.

The new Homestake cyanide mill, work on which has been commenced at Gayville, will not be quite as large a plant as the one at Lead, but will be built for the treatment of tailings from the 420 stamps of the DeSmet, Deadwood-Terra and Caledonia mills.

#### UTAH.

##### BOX ELDER COUNTY.

The Gold Standard M. Co. has been incorporated at Salt Lake City; capital \$25,000; W. H. Weyher is president of the company and E. H. Jones secretary. The company owns the Tiger-Poorman and nine other mining claims in Park valley.

The Brooklyn M. & M. Co. has been incorporated at Salt Lake City; capital \$400,000; J. A. Graham is president of the company and R. S. Connor secretary and treasurer. The company owns the Brooklyn group of nine mining claims in Park valley.

The Copper King M. Co. has been incorporated at Salt Lake City; capital \$30,000; H. T. P. Grey is president of the company and G. J. Badertacher secretary and treasurer. The company owns the Roosevelt and nineteen other mining claims in Blue Creek district.

##### JUAB COUNTY.

The Bonanza M. & M. Co. has been organized at Robinson, capital \$300,000, to develop the Copper Queen & Bonanza group of seven mining claims, West Tintic. D. A. Dupue is president, A. J. Underwood vice-president, G. Jones secretary and treasurer.

##### PIUTE COUNTY.

The announcement has been made that the present capacity of the Annie Laurie on Gold mountain will be doubled during the winter. It is also said that work on the lower tunnel, at the mouth of which stands the mill, is to be started up and continued to a connection with the main ore bodies.

##### SALT LAKE COUNTY.

For \$4500 J. J. Burnswood has sold to the Alta Con. M. Co. four locations in Little Cottonwood canyon, near Alta, the company having already begun active development.

A. Murphy has bought the Good Luck No. 2 claim, at Alta, for \$2500, from C. B. Durst and associates. Mr. Murphy, it is reported, will begin active work on the property at once.

The Highland Boy smelter during September produced over 900,000 pounds of copper, gold and silver-bearing bullion of the value of over \$200,000, a new record for the company. This was derived from over 15,000 tons of ore smelted during the month.

The Pioneer Con. M. Co. has been incorporated, capital \$300,000, by A. Murphy president and F. A. Earls secretary, with office at Salt Lake City. The company owns the Good Luck, Good Luck No. 2, Eldorado, Lookout, Pioneer Nos. 2 and 3 and a bond on the Pioneer, in American Fork and Little Cottonwood districts.

##### UTAH COUNTY.

In the Lake Superior country W. Loose of the Big Indian M. Co. has discovered that in his process gas can be used instead of charcoal. He says he is now prepared to proceed with the erection of the Big Indian plant at Provo. A converter will be put in, as at the valley smelters.

#### WASHINGTON.

##### FERRY COUNTY.

Meteor Camp is on the south half of the Colville Indian reservation, which was opened for mineral location in July, 1898. It is reached from Spokane by train to Meyers Falls, thence by stage to Daisy, 20 miles. From Daisy the distance by a good wagon road is 10 miles to the principal properties of the camp.

The management of the Princess Maud Co. has decided to close down the mine at Republic until the new railroad comes into Republic, when it is hoped that by shipments to Grand Forks the property can be put upon a self-sustaining basis.

##### LINCOLN COUNTY.

What is believed to be the first car of Washington lead ore treated by a British Columbia smelter has lately been shipped to the new smelter at Nelson by the Silver Basin M. Co. of Davenport. The ore is silver-lead and the owners make a gain over smelter charges of \$10 per ton on ores.

##### STEVENS COUNTY.

Keswick, Cal., has been one of the sources from which the Northport smelter has drawn men to take the places of strikers. Joplin, Mo., and Leadville, Colo., have also contributed. A trainload of men arrived at Northport on the 1st inst. and went to the smelter without trouble. Six hundred and fifty men are reported hired by the smelter people during the past sixty days. Not all of these men have remained at Northport, as some have gone to the Rossland mines, where they have found work at higher wages.

President J. Brown of the Orient M. Co. says: "Our working tunnel is now in 600 feet. We have not yet struck the main ledge, but have crosscut three others, one of which carries 3 feet of ore assaying on an average of \$100 per ton. The values are principally nickel and cobalt. Several other properties near the Orient also have good assays in nickel." The Orient property is located near Bossburg, a few hundred feet distant from the line of the new railway to Republic, and about 15 miles out of Marcus by way of that line. The distance to Bossburg from Northport by wagon road is 10 miles.

#### FOREIGN.

##### BRITISH COLUMBIA.

Head & Butts Bros., who have been working the Butts hydraulic claim near Barkerville, report a clean-up for the season of 300 ounces, yielding \$5595.

J. J. Palmer, owner of Marble Bay mines, Texada Island, states that he is now shipping 1000 tons per month to the smelter. The shaft is 250 feet deep and there are more than 3000 feet of underground workings.

It is stated that seventy-five tons of ore are on the dump ready for shipment from the sulphur mines on the Oxtal river, a tributary of the Skeena.

Marysville, it is said, has been selected as the site for the smelter of the Sullivan M. Co.

It is reported that the vein in a shaft on the Railway ledge of the Winnipeg mine, in Wellington camp, is widening and improving in value. It is stated that one car from the vein averaged \$34.09 in all values, principally gold. A small hoist plant has been installed.

A. McMillan, managing director of the Snow Shoe G. C. mines, and J. A. Astley, chief engineer, have been examining the mines and say the company is considering the erection of its own smelter as against the alternative of sending the ores to a custom smelter. Data is being gathered. The mines are located in Phoenix Camp, near Phoenix.

A find of gold-bearing black sand on the northwest coast of Vancouver island is reported. Seventy ounces of gold have been taken out.

##### MEXICO.

F. A. Vickery, of Ocatlan, State of Oaxaca, Mexico, says that the Rothschilds have just bought the La Esquadra copper mines at Ocatlan for \$2,000,000 in gold. The La Esquadra mine, it is said, produced \$508,000 worth of ore during 1900, and the output for the present year will greatly exceed that amount.

##### KLONDIKE.

The first stamp mill in the Klondike district has been started up by Spencer & Munger on the Klondike river. The mill is steam power and is working on ore brought from quartz mines now being opened on the Dome mountain, at the base of which head some of the richest Klondike creeks. Quartz claims on Dome were staked out two years ago, but it was not until C. Berry of Fresno, Cal., and his partners began opening some of them this summer that their value was positively known. Berry has sunk shafts on veins carrying rich free-milling ore.

#### Personal.

JOHN HAYS HAMMOND was in Park City, Utah, early in the week.

M. L. EFFINGER, of the Ophir mine, of Stateline, Utah, is in New York.

T. F. LAIRD has resigned as Supt. of the Duchess mine at Vallecito, Cal.

G. B. EARNSHAW, of Bingham, Utah, is in northern Idaho examining mines.

J. F. HOHEISEL assumes the management of the Avino mills, Avino, Durango, Mexico.

F. C. COOLEY, representing the Denver Fire Clay Co., Denver, Colo., is in San Francisco.

J. A. MORTON, of Ontario, Oregon, has returned to that place from a sojourn in Nome, Alaska.

G. PETERSON, of Boise, Idaho, has returned from a several months' visit to Nome, Alaska.

M. ROURKE, late Supt. of the Camp Bird mine at Ouray, Colo., is in Montana examining mines.

A. F. HOLDEN of Bingham, Utah, has returned to that place after a lengthy sojourn in New York.

C. C. KNUTSON, manager of the Great Republic mine, near Northport, Wash., has returned from Chicago, Ill.

C. STEVENSON, of Pittsburg, Pa., has been appointed superintendent of the Keystone M. Co., at Leadville, Colo.

J. E. LYONS, of Lewiston, Montana, has returned to that place after four years of residence in Dawson, Yukon Ter.

W. LOOSE, who has been studying methods in the Lake Superior copper country, has returned to Provo, Utah.

GEO. T. RIVES, late of Lillooet, B. C., is in San Francisco, negotiating sale of some northern California mining properties.

CHAS. BUTTERS is in Salt Lake City, Utah, after six months' absence in London. He will leave for Central America shortly.

J. M. HEUTON, of Deadwood, S. D., has returned there after several weeks absence engaged in examining the gold ore deposits in Fergus county, Montana.

P. H. BUTLER, the discoverer of the Tonopah mines in Nye county, Nevada, and J. H. Jenkins, general manager of the Tonopah M. Co., are in San Francisco.

#### Commercial Paragraphs.

L. W. TATUM, manager of the Oro M. Co., has contracted to use the pneumatic cyanide process in Arizona on a royalty.

PERCY R. STUART, Pacific coast agent A. Leschen & Sons Rope Co. of St. Louis, Mo., reports signing a contract with the Pacific Portland Cement Co. of Suisun, Cal., for a 2750-foot Leschen automatic tramway, stated capacity thirty tons per hour, to carry rock from quarry to mill. The cement company's plant will have a capacity of 1000 barrels per day. Mr. Stuart has a similar contract with the San Luis M. Co., San Dimas, Durango, Mexico, for two 1300-foot spans, capacity five tons per hour. His San Francisco office is 85 Fremont street.

The Bradley Pulverizer Co. of Boston, Mass., report great successes with their Griffin mills, especially among Portland cement makers, whom they report as saying that they are the most economical mills in the market. Among the many recent sales have been twenty-four Griffin mills to the Great Northern Portland Cement Co.; twenty-two Griffin mills to the Lehigh Portland Cement Co., for their new works in Indiana; and thirty-two mills to the Indiana Portland Cement Co., with other sales about consummated. Such large offers from such large concerns certainly argue that the Griffin mills are well worthy of their leading position in the trade.

#### Notices of Recent Patents.

Among the patents recently obtained through Dewey, Strong & Co.'s SCIENTIFIC PRESS U. S. and Foreign Patent Agency, the following are worthy of special mention:

BED BOTTOM AND UPHOLSTERY SUPPORT.—No. 683,175. Sept. 24, 1901. John Hoey, San Francisco, Cal. The object of this invention is to support elastic bed bottoms and upholstery in such a manner as to prevent breakage and to render the parts more enduring. It consists in the combination with a bed bottom with side and end rails, a woven wire fabric stretched between and conical spiral springs, the bases of which form a support for the woven wire fabric, and transverse tubular rods extending between the sides of the bed bottom, these rods underlying and forming a rigid support for the springs and having their ends fitted to the inner sides of the side rails. Holes are bored through these rods, and the straight extensions at the lower ends of the springs fit into



[illegible]



## SITUATIONS WANTED.

**WANTED—POSITION AS CYANIDE MAN** or Assayer. Understands chemical analysis. Address M. S., care Mining and Scientific Press.

An experienced mill man desires position in mill; understands Amalgamation, Concentration and Assaying. Address G. M., this office.

A first-class machinist, engineer and cyanide man wants situation. Ten years experience in cyanide plants; three years foreman; three years superintendent. All reference. Box 99, this office.

**YOUNG GRADUATE MINING ENGINEER** desires appointment as surveyor, assayer, or assistant to superintendent. Four years' experience in lead, tin, copper and gold mining. Good references. Apply L. T., this office.

**WANTED—Position** by a young man of 28, as private secretary to mining operator or with mining company; is a stenographer and a surveyor; has had practical experience in mining operations, prospecting, and in hydraulic engineering. Address J. A. T., care Mining and Scientific Press.

**WANTED.**—Position as superintendent or general manager of a copper smelter or Bessemer plant. Eighteen years' experience. Speak Spanish. Thorough knowledge of carbonate or sulphide ores. References exchanged. Address Box 601, care Mining and Scientific Press.

**WANTED.**—Position by a practical mine foreman in America or Mexico. Have twenty-one years' experience in gold, silver, copper, lead and tin mines. Speak Spanish. Have best of recommendations. Modest salary required. Address J. R. H., care Mining and Scientific Press.

**WANTED.—SITUATION BY A PRACTICAL** mill man, assayer and cyanide man; is also a practical miner. Understands mine bookkeeping. No objection to Mexico. Best of references. Address W., care Mining and Scientific Press office.

A Civil and Mining Engineer (member American Society of Civil Engineers, member American Institute of Mining Engineers), at present general manager of a Western gold mining company, desires change. Will go anywhere. Examining or reporting, exploration work or operating. Address Box 264, Grangeville, Idaho.

**MINING ENGINEER**, graduate Mass. Inst. Tech., with thirteen years' experience as miner and surveyor for large copper company in Montana; superintendent of coal mine, washer and coke oven plant and railroad in South for six years; in charge of zinc property in Missouri; familiar with concentrating methods; at present in charge of cyanide operations of tailings pile in California, desires position with reliable company. Open for engagement after October 15. Address S. J. M., care Mining and Scientific Press.

There is in Butte, Mont., a young man (32) who has worked in all kinds of metal mines in seven different States for 12 years. He has made a study of mineralogy, geology, surveying and timbering for years, and though he still wears a number 7 1/2 hat, yet thinks he is capable of taking charge of and successfully running a mine. There is no question as to his experience and knowledge, only his executive ability needs demonstration; and he has been "man handled" so long he thinks he is fully capable of doing a little handling on his own account. First-class references. Address "Young Feller," Box 1182, Butte, Mont.

**EXPERIENCED MINING ENGINEER** (43) will leave for Philippines in November. Will accept commissions, and present himself with credentials to reliable parties wishing his services there, after November 1, 1901. Address Supt. M. & M. C. M. & S. Co., Altyn, Montana.

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We have six thousand acres of Coal Land to prospect by boring. Who may be interested, communicate with the KNAPP COAL CO., Astoria, Or.

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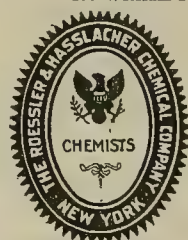
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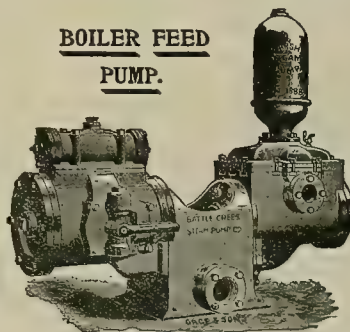
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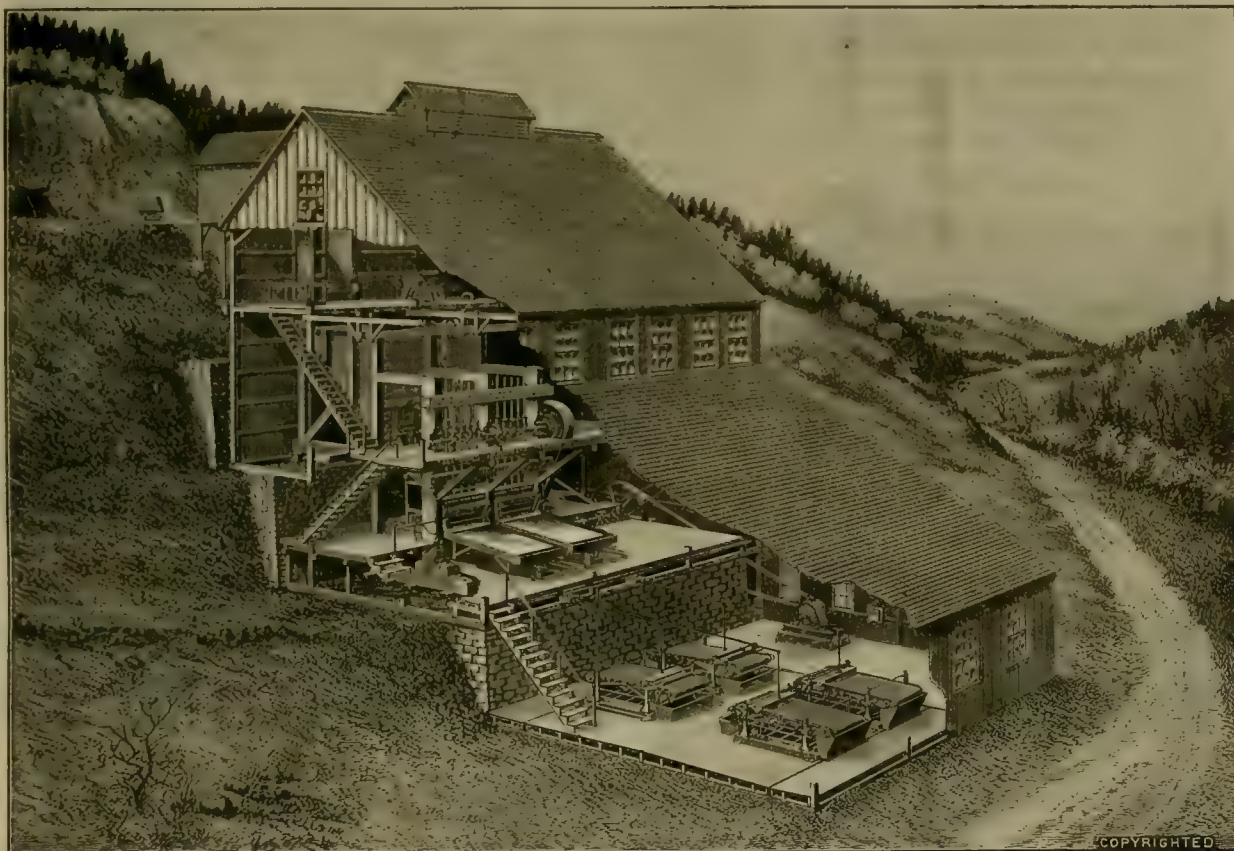
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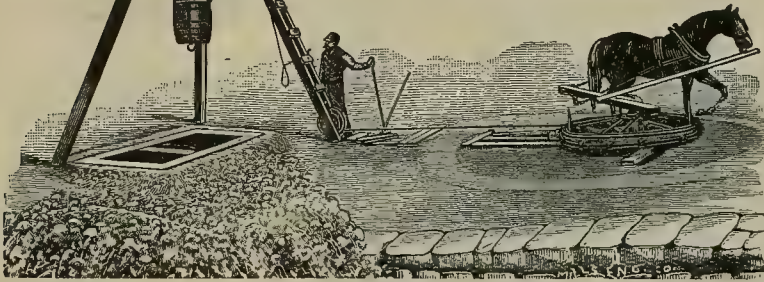
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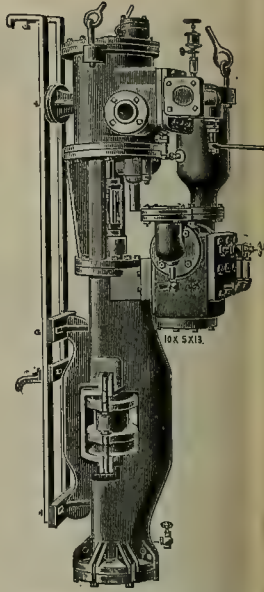
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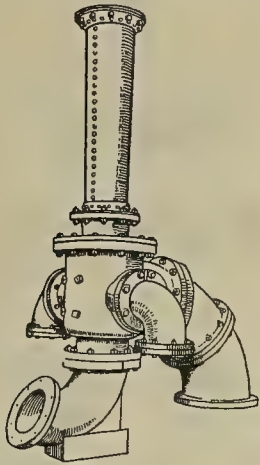
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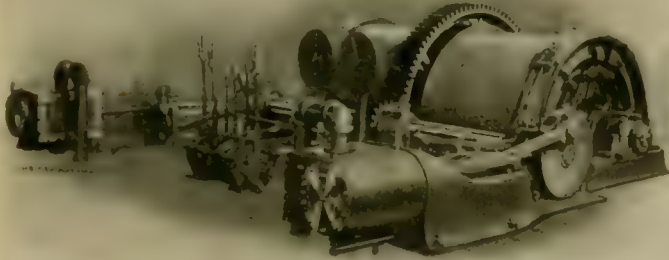
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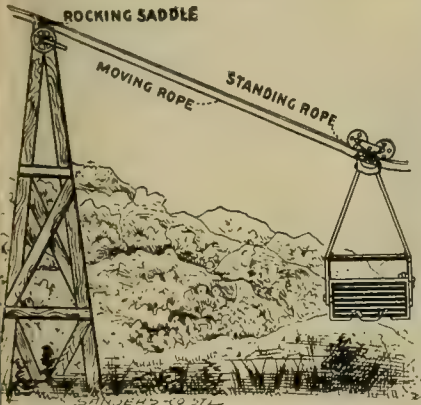
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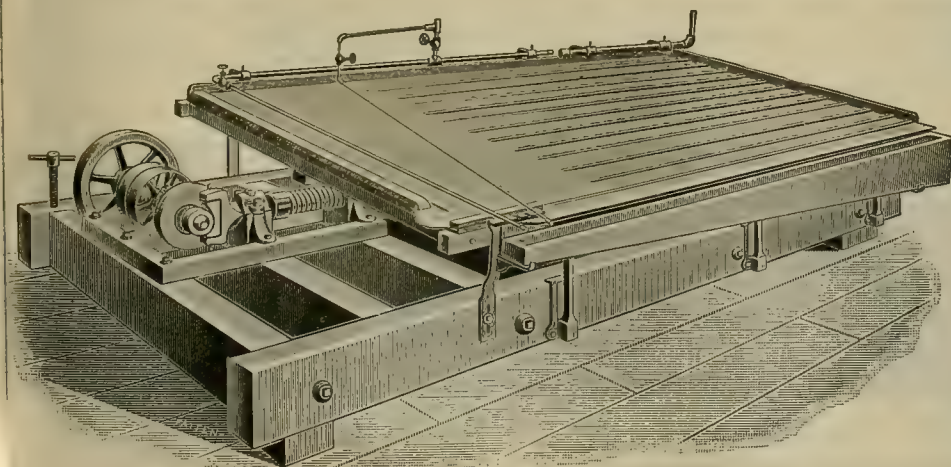
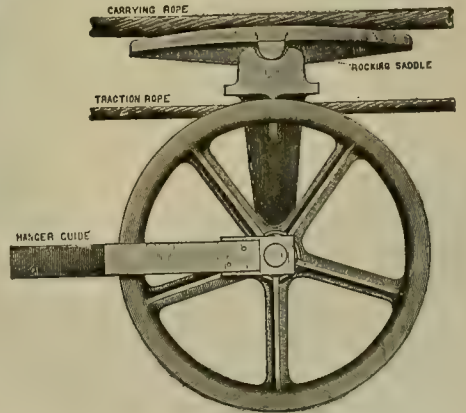
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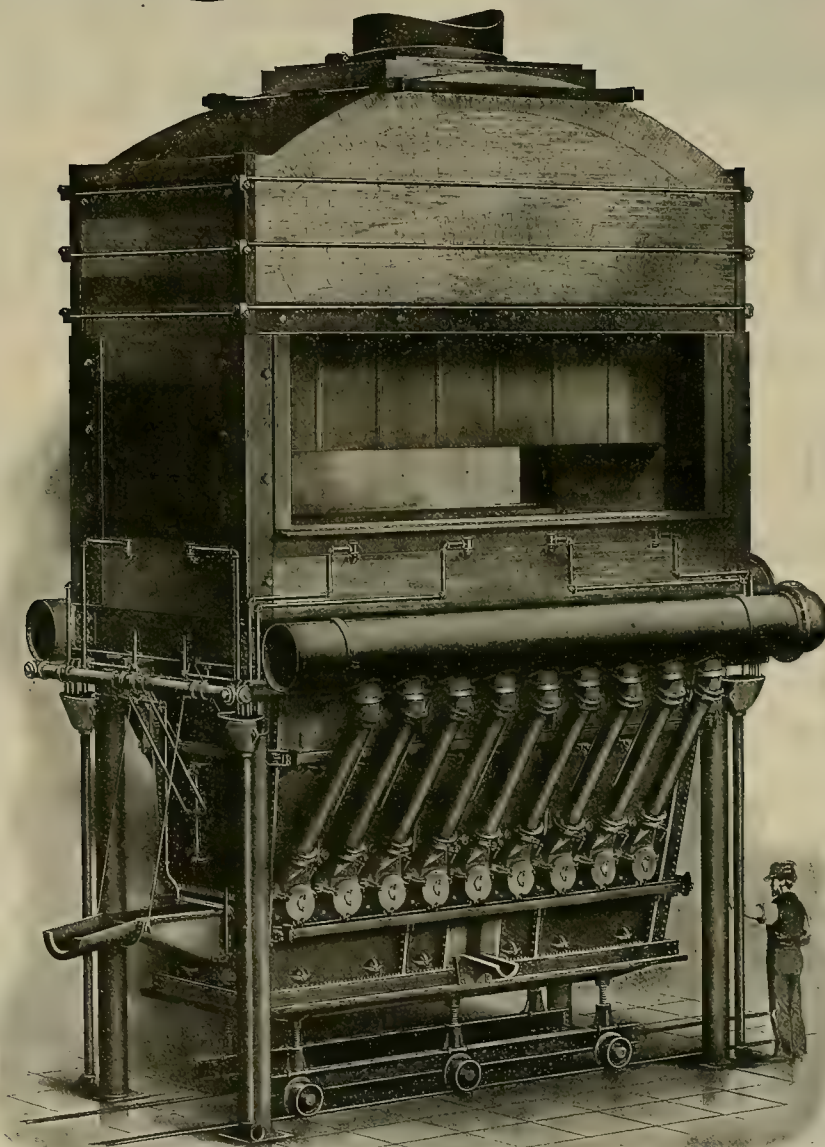
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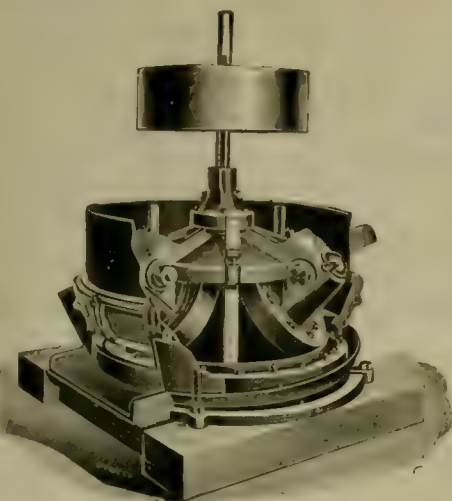
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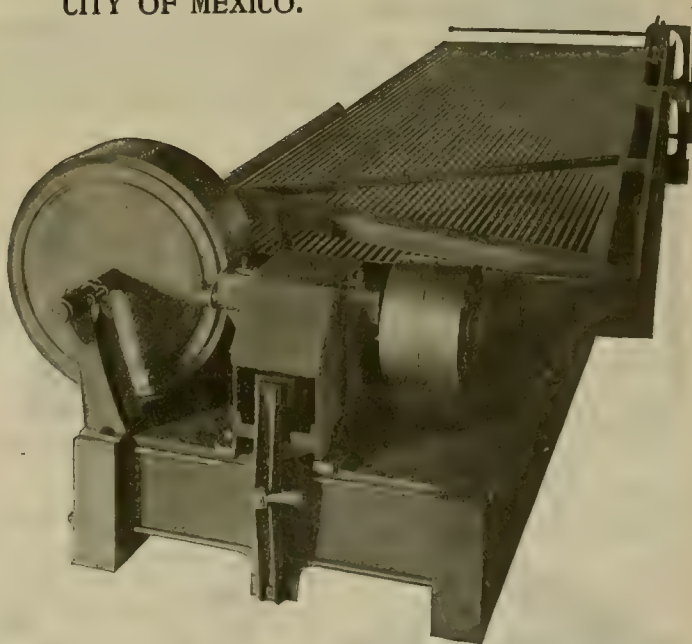
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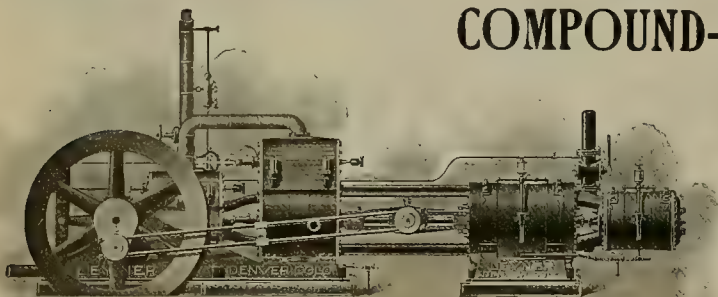


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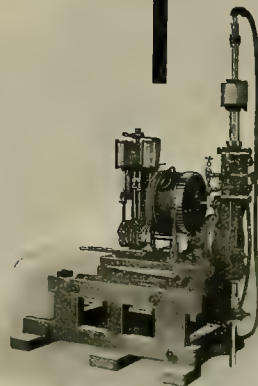
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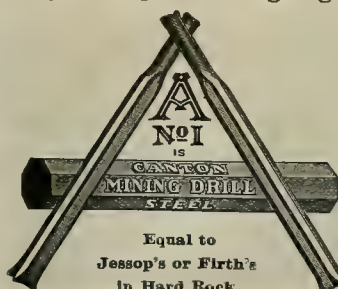
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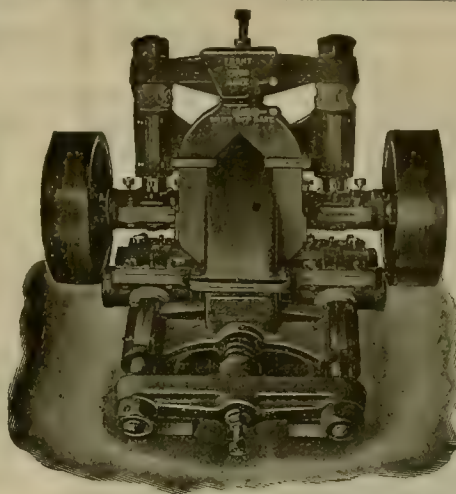


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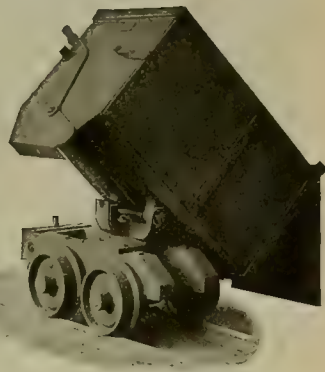
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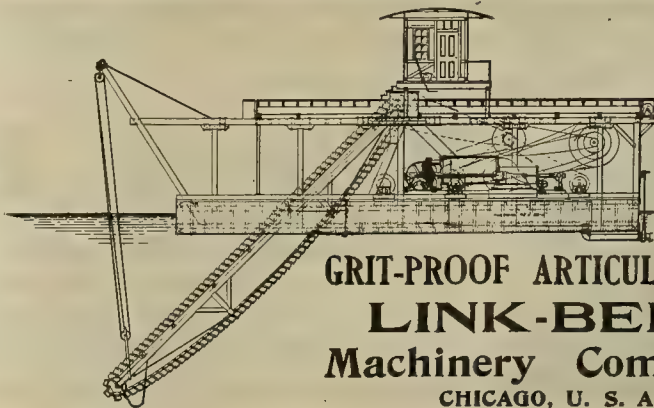
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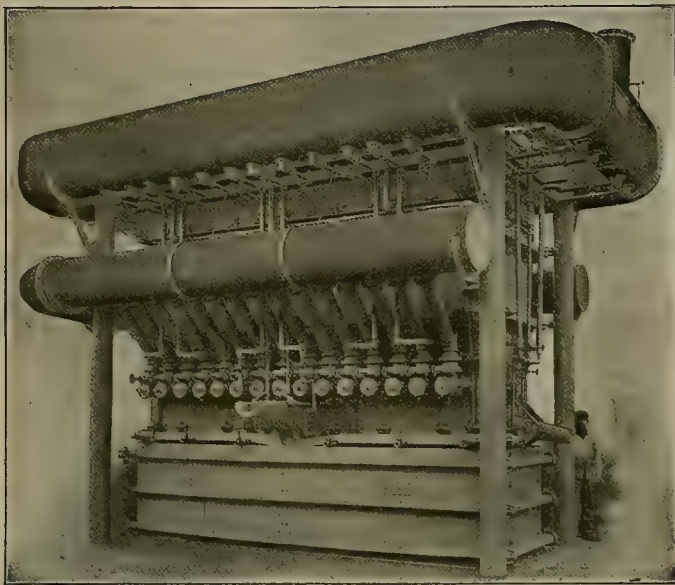
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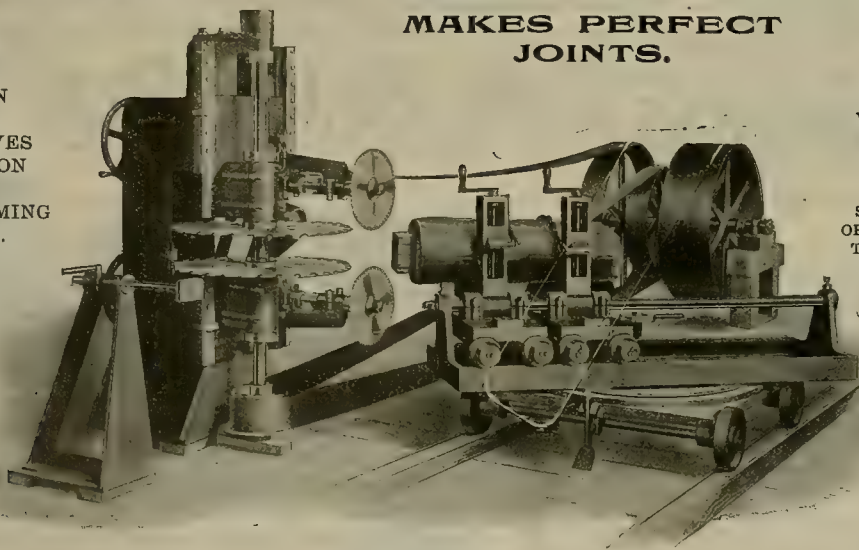
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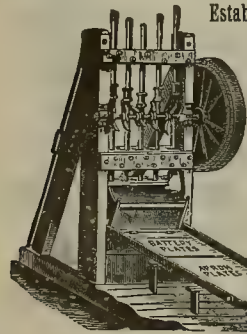
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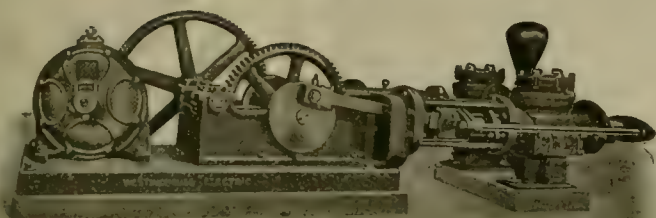
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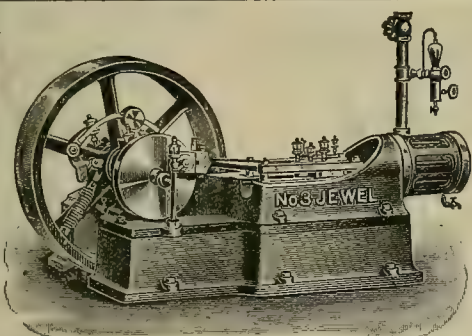
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A THOROUGHLY RELIABLE, SIMPLE, HIGH CLASS, PERFECTLY GOVERNED AUTOMATIC ENGINE AT A REASONABLE PRICE.

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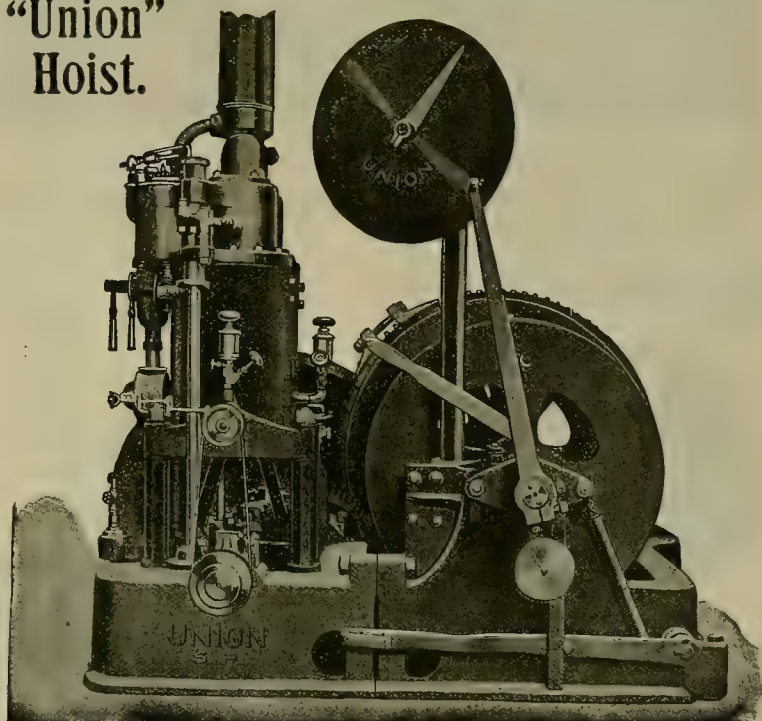
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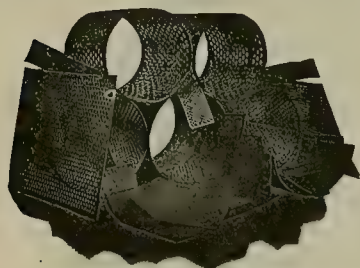
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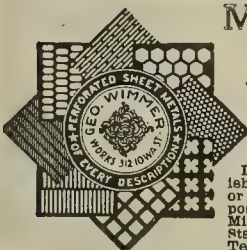
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Capacity..... 6 to 10 tons per day.

Weight of Mill complete with 850-lb. stamps. 8300 lbs.

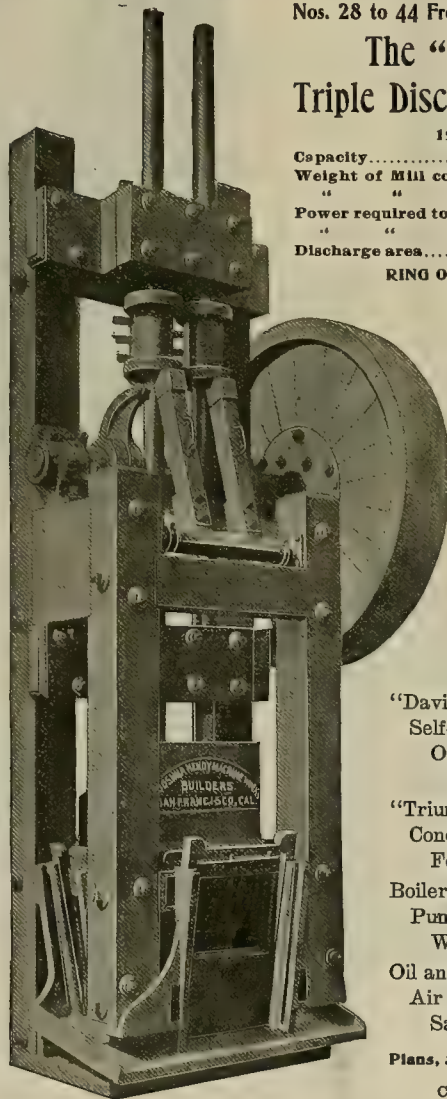
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"Davis" Horse Power Hoisting Whims,
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We will purchase for cash if in good condition.

We purchased last spring and have dismantled and resold the Diamond Hill mill, 120 stamps, vanners, water power, etc. Montana Gold Mining Co., 6 Huntington mills, power, etc.

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With buckets having capacity of seven and a half cubic feet. Dredge only used few months. Located on Grasshopper creek, near Bannock, Mont. For full particulars, address THE BUCYRUS COMPANY, South Milwaukee, Wis.

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One Duplex Rix Air Compressor, 20-in. Cyl. by 30-in. Stroke, Driven by Direct Connected 25-ft. Cobb Wheel, 120 H. P.

Will be sold cheap, with or without water wheel. Condition good. Address L. J. HOHL, Cherokee, Butte Co., Cal.

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Two 39-inch Pelton Wheels on same shaft, especially designed for heavy duty. Each wheel designed to generate 350 H. P. with head of 173 feet. Complete in all details—heavy floor stands, with ring oiling bearings; steel housings; steel floor beams; four throttle valves and electric governor. Plant guaranteed good as new. Ran about four months. Together with 148 feet of 42-inch double riveted steel flume.

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Cost \$1000.00. Has been used about six weeks. Price \$550.00 f. o. b. Norris, Mont. Apply to C. O. BARTLETT & CO., 43 Center St., Cleveland, Ohio.

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Send for Catalogue No. 37.

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DELINQUENT SALE NOTICE.

WILLETTA MINING AND MILLING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Tuolumne County, California.
Notice.—There are delinquent upon the following described stock, on account of assessment (No. 2) levied on the 19th day of August, 1901, the several amounts set opposite the names of the respective shareholders, as follows:

| Names. | No. Cert. | No. Shares. | Amt. |
|--------------------------|-----------|-------------|-------|
| H. L. Ladd..... | 33 | 1250 | 12 50 |
| William Nolden..... | 2 | 10 | 10 |
| William Nolden..... | 104 | 1000 | 10 00 |
| William Nolden..... | 107 | 1000 | 10 00 |
| William Nolden..... | 108 | 1000 | 10 00 |
| Frank E. Cordes..... | 144 | 10 00 | 10 00 |
| Frank E. Cordes..... | 145 | 3000 | 30 00 |
| Frank E. Cordes..... | 146 | 750 | 7 50 |
| Frank E. Cordes..... | 147 | 750 | 7 50 |
| Fred M. Bowman..... | 9 | 600 | 5 00 |
| Carl Vogel..... | 19 | 100 | 1 00 |
| Charles Zissig..... | 30 | 10 1 | 1 00 |
| Charles Zissig..... | 65 | 250 | 2 50 |
| Charles Zissig..... | 71 | 250 | 2 50 |
| Harry H. Becker..... | 21 | 250 | 2 50 |
| G. W. Smith..... | 11 | 100 | 1 00 |
| Frank Quinn..... | 58 | 1000 | 10 00 |
| W. T. Rangel..... | 59 | 250 | 2 50 |
| Robert Vincent..... | 60 | 1000 | 10 00 |
| Frank Fischer..... | 81 | 2000 | 20 00 |
| William F. H. Osmun..... | 87 | 5 0 | 5 00 |
| William F. H. Osmun..... | 88 | 500 | 5 00 |
| John P. Albro..... | 89 | 2500 | 25 00 |
| J. P. E. Heintz..... | 106 | 250 | 2 50 |
| George E. Stayton..... | 117 | 2000 | 20 00 |
| George E. Stayton..... | 124 | 500 | 5 00 |
| M. Reubold..... | 6 | 10 | 10 |
| Alfred I. Levy..... | 14 | 1000 | 10 00 |

And in accordance with law, and an order from the Board of Directors, made on the 19th day of August, 1901, so many shares of each parcel of such stock as may be necessary, will be sold at public auction at the office of said company, Room 8, 206 Sansome street, San Francisco, California, on MONDAY, the 21st day of October, 1901, at the hour of 1:30 o'clock P. M. of said day, to pay said delinquent assessment thereon, together with costs of advertising and expenses of sale.

E. McALLISTER, Acting Secretary.

Office—Room 8, No. 206 Sansome street, San Francisco, California.

DELINQUENT SALE NOTICE.

ETNA PETROLEUM COMPANY.—Principal place of business, San Francisco, California.

Notice.—There is delinquent upon the following described stock, on account of assessment levied on the 22d day of August, 1901, the several amounts set opposite the names of the respective shareholders, as follows:

| Name. | No. Cert. | No. Shares. | Amt. |
|---------------------|-----------|-------------|----------|
| J. A. Chanslor..... | 7 | 25 | \$250 00 |

And in accordance with law, and an order of the Board of Directors, made on the 22d day of August, 1901, so many shares of each parcel of such stock as may be necessary, will be sold at the office of the company, No. 316 California street, San Francisco, California, on the 14th day of October, 1901, at 2 o'clock P. M. of such day, to pay delinquent assessments thereon, together with costs of advertising and expenses of the sale.

R. F. MACLEOD, Secretary.

Office—No. 316 California street, San Francisco, California.

ASSESSMENT NOTICES.

THE CALIFORNIA DREDGING COMPANY.—Principal place of business, 120 Sutter Street, San Francisco, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 13th day of September, 1901, an assessment (No. 2) of \$10 per share was levied upon the capital stock of the corporation, payable immediately in gold coin, to the secretary of the corporation, at the office of the company, Room 56, 120 Sutter Street, San Francisco, California. Any stock upon which this assessment shall remain unpaid on MONDAY, the 21st day of October, 1901, will be delinquent and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 11th day of November, 1901, to pay the delinquent assessment, together with the cost of advertising and expenses of sale.

SAM. W. CHEYNEY, Secretary.

120 Sutter Street, San Francisco, California.

MARIPOSA COMMERCIAL AND MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Mariposa County, California.

Notice is hereby given that, at a meeting of the Board of Directors, held on the 11th day of September, 1901, an assessment (No. 2) of Ten Dollars per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, Room 223 Crocker Building, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 21st day of October, 1901, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 11th day of November, 1901, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.
ALEX. GRANGER, Secretary.
Office—Room 223 Crocker Building, San Francisco, California.

MARINA MARISCANO GOLD MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Sunny Hill, Shasta County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 7th day of September, 1901, an assessment (No. 2) of one (1) cent per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin to the secretary, at the office of the company, 217 Sacramento street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 14th day of October, 1901, will be delinquent and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 4th day of November, 1901, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.
CHAS. BOVONE, Secretary.
Office—217 Sacramento street, San Francisco, California.

OSCEOLA CONSOLIDATED MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Plymouth, Amador County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 28th day of August, 1901, an assessment (No. 12) of one (1) cent per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 307 Montgomery street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 5th day of October, 1901, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 28th day of October, 1901, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.
HOLLAND SMITH, Secretary.
Office—307 Montgomery street, San Francisco, California.

TANANA MINING COMPANY.—LOCATION OF principal place of business, San Francisco, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 30th day of September, 1901, an assessment (No. 4) of ten cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, Room 801 of the Claus Spreckels Building, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 4th day of November, 1901, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 2nd day of December, 1901, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.
EDWARD H. STEARNS, Secretary.
Office—Room 801 Claus Spreckels Building, San Francisco, California.

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HOUSES.**

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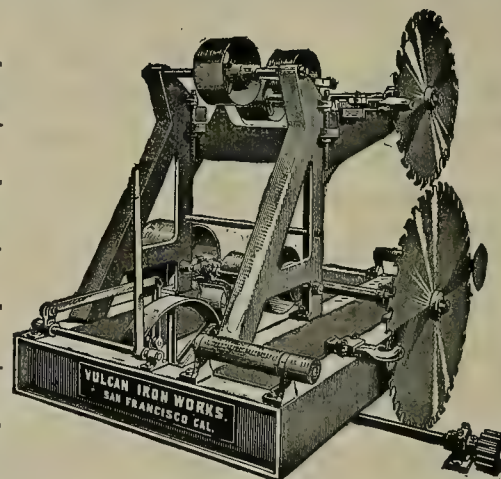
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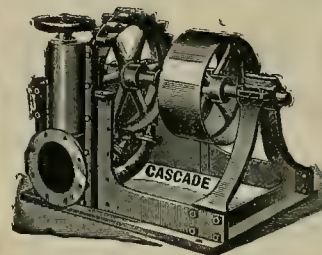
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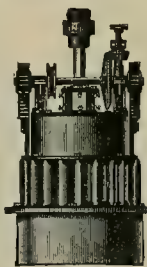
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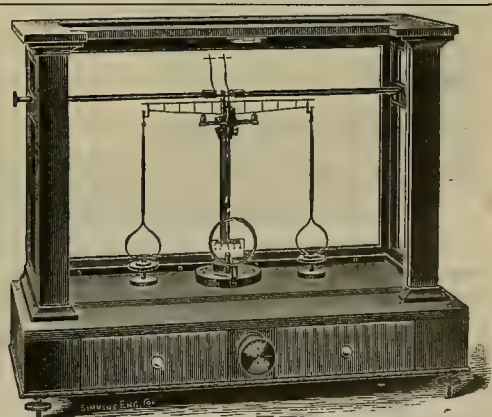
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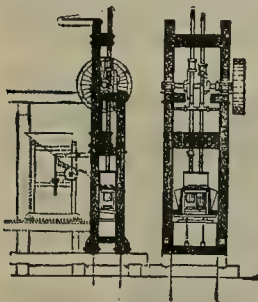
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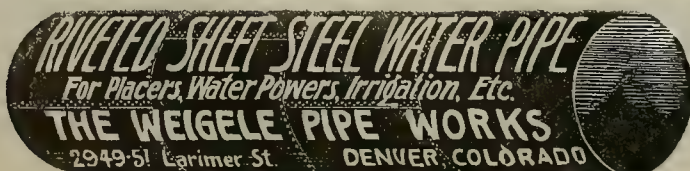
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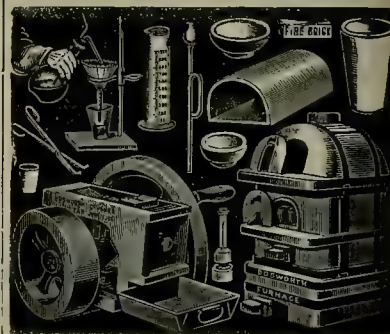
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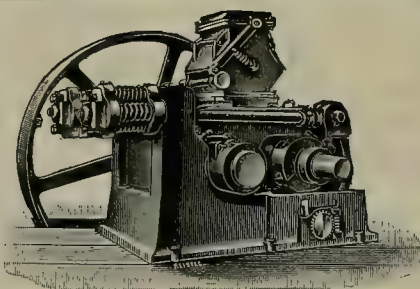
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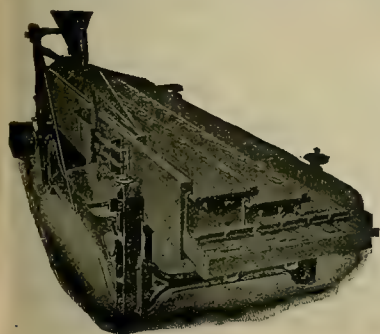
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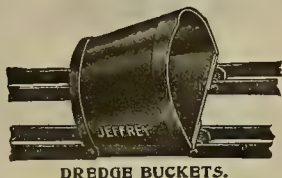
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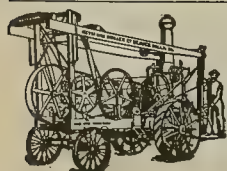
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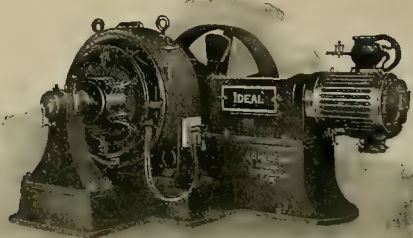
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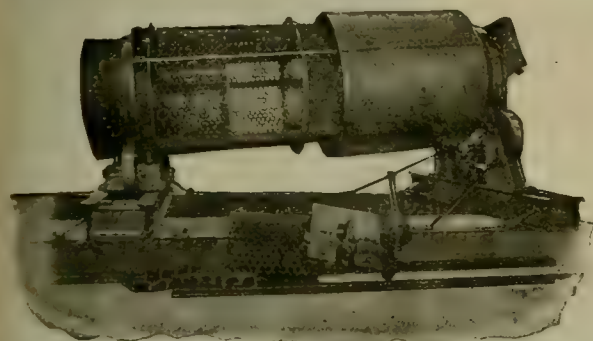
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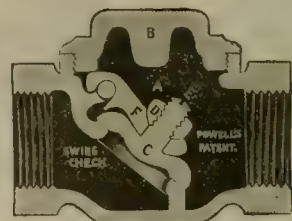
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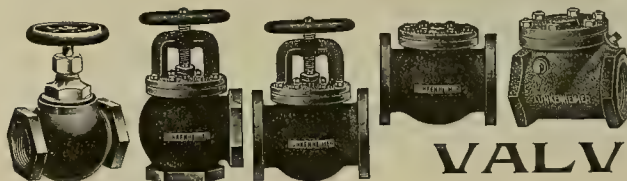


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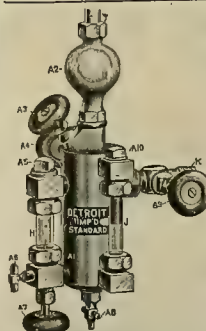
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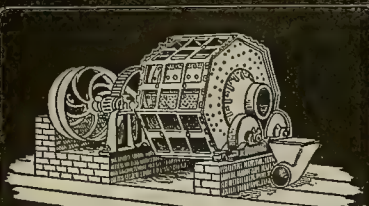
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AN EXPERT OPINION.

L. S. Russell of Lansing, Mich., of the Bureau of Labor and Industrial Statistics of Michigan, has recently completed a tour of investigation of the Portland cement industry of his State. He is particularly enthusiastic over the Omega Portland Cement Company's plant at Jonesville, Michigan, which he terms "the really model factory, where everything is run on a perfect system."

"Cement," Sept. 1901.

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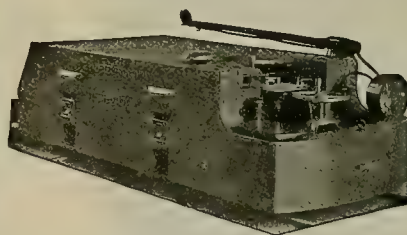
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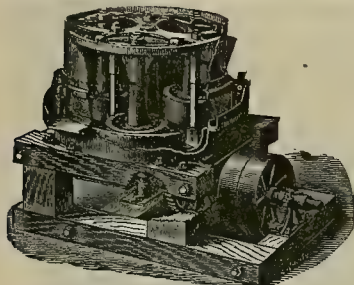
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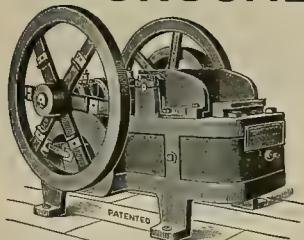
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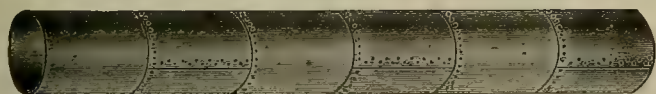
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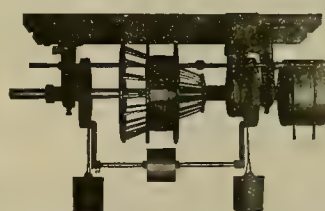


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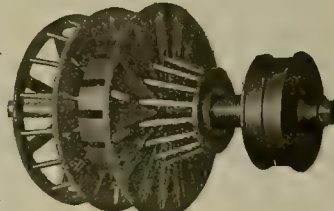


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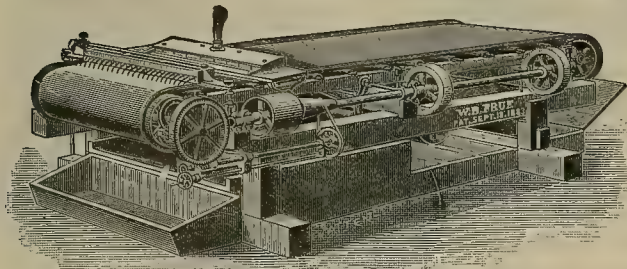


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Eastern and Western Nevada.

Nevada in 1901 is receiving a renewal of the exploration and exploitation activity of the early '60s. In this all sections of the State seem participating. Names of places that one could conjure with in the old days, are again familiar, and again mean the promise of great mineral production, and new names are fast getting the significance the older ones have.

White Pine county, in the extreme east of the State, to the old miners will recall silver mines of vast riches, with their wealth close to the surface in easily reducible ores. Ely, Hamilton and Osceola were great camps once and may become even greater camps again. The illustrations of Ely and White Pine county scenes on this page are views taken just about the beginning of the new industrial life that may fast build the places out of their old recollections. Utah miners, with the money they have made in the mines of their home State, have lately been crossing the line into White Pine county in increasing numbers. Quite a number of old properties have been taken up by them, and the

possibilities are for more fortunes in the gold and copper the old miners left behind than in the silver they took with them. Many causes are contributing under the surface to this new attractiveness of White Pine mines. They may all be comprehended in the one word "availability." The minerals were long since known to exist. Now they have become mines, because now available. The processes of reduction of ores have simplified and cheapened in the interval. The transportation facilities have increased and cheapened and the metals sell for more than they used to.

Western Nevada has not been behind in receiving the same impulse toward increased mining activity. Mason Valley in Lyon

county, than which nothing, to judge from the illustration on this page, could seem more fitted for the home of the jack-rabbit and the coyote, is discovered to be a region of considerable possibilities in copper mining. Quite a number of large operations have been started by Eastern and Montana capital largely.

Smelters have been built and put in blast and copper made. In the vicinity of the county seat—Dayton—there has been a revival of work in gold mines, which, but for the nearness of the Comstock, would long since have been largely developed.

Wood drives on the Carson river have been very closely associated with western Nevada mining. The Comstock region never contained much timber, and the near-by growth that could be used was early exhausted. Among other localities drawn on for wood, for fuel principally, were the forests in the headwaters of Carson river, in Douglas county, Nevada, and Alpine county, California. The wood cut there was floated the



Typical View in Western Nevada.



Scenes in White Pine County, Nevada.

first stage of its journey in "V" flumes, and then in the Carson river to booms by the stamp mills and railroads. These forests, too, have been almost completely used up by the mines. The power for the machinery that they furnished used as fuel now comes from water. Not the water of Carson river, which may later be so utilized, but the water of Truckee river has been harnessed into electric generation and transmission plants, and is made to do the work at Virginia City on the Comstock and at Reno on the new mines under development there. Walker river flows through Mason Valley, and it is quite within the possibilities to foresee the time when its flow in the upper mountain sections shall be utilized by power plants to do the work of mines in Mason Valley. White Pine county unfortunately has no such possibilities of cheap transmittable power. Its opportunities can, however, be made more valuable by the better railroad facilities through the projected extension of the road now ending at Eureka to Ely. This is only waiting on a determination of the extent of the copper ore bodies.

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MINERS in the Kougark district, near Nome, report finding evidences of ancient working of some of the placers. The constructions they report finding—a coffer dam and bed rock drain, built with stone walls—are characteristic of Russian mining in Siberia. There is nothing improbable in the theory that the mining was done by the Russians.

THE California State Railroad Commission have rendered a decision in the case of the petroleum rate from the Kern river field. The findings of the majority are (1) that the existing rate of 42 cents a barrel is unreasonable, (2) that the cost of carriage of the petroleum is 33.5 cents a barrel from Bakersfield, and (3) that 37.8 cents a barrel is a reasonable rate. They have ordered that the last named figure be put into force after November 1. Commissioner Blackstock dissents from these findings, holding that the evidence showed the present rate to be reasonable. Petroleum shippers are not satisfied with the reduction, claiming that it is too little. Their contention would seem to be sustained by the facts, even if the evidence offered, as the dissenting commissioner claims, fails to sustain them throughout.

In another column appears a paper on the possibilities of cement manufacture in California by A. H. Cederberg. Attempts have been made in California to make cement that have not been commercial successes. Most of these are some years past now, and commercial conditions have changed. Methods and machinery for making cement have been improved by American manufacturers in the Eastern States. The cost of fuel has decreased in California through the development of petroleum. Uses for cement have enormously expanded. At the same time the price of imported foreign cement has not decreased. The opening for capital should not be overlooked. There is business even now for more works than at present projected. Lowered prices which local production would bring would increase consumption, and there is certain to be in a very few years a market for enormous quantities in the construction of the Nicaragua Canal. The estimates of construction call for 20,000,000 barrels. Inasmuch as the larger portion of it would be required at the Pacific end of the canal for harbor and lock construction, manufacture in California or elsewhere on the Pacific coast should be past the stage of experiments before the demand comes. The transportation costs favor the making of the cement on this coast; but it may be counted on as a certainty that the engineers in charge of the canal construction will not accept it on that account. The cement must have proved its value in comparison with Eastern cement before it will be considered.

The California State Miners' Association.

Ten years ago this month the meeting of Placer county, California, miners was held in Auburn, Cal., which called the first State convention of what is now the California State Miners' Association. On the 21st inst. that Association will hold its tenth annual meeting in San Francisco, Cal.

Of its kind the Association is the only one. There have been and are now mine owners' associations, organized and operating to subserve special business purposes more or less local. Miners' labor unions are common as associations of miners whose occupation consists in doing mining work for wages or on contract. Boards of trade and merchants' associations have a limited field of membership, and provide for certain public activities more localized than otherwise.

The California State Miners' Association has the unique distinction of being an organization inclusive of the objects of organization and personnel of membership of all of the others. It is composed of mine owners, miners who work for wages, the business people of the mining communities, and the merchants and manufacturers of San Francisco and other large commercial and industrial centers of population.

The Association was founded, in the first instance, on the community of interest principle. Mine owner, mine worker, local storekeeper, city merchant and manufacturer recognized their mutuality of interest in the gold in the mines which made possible the mining industry. The mine and the men who worked in the mines were recognized as the essential elements in the providing of gold to be divided among all. Unless the mines could be permitted to operate, and under conditions which would pay the mine owner and the mine worker, no one could have any of the gold.

This community of interest of all California people was discovered when the great gold producers of the State—the hydraulic mines—were all closed down by injunctions as a result of debris flow into the Sacramento valley, and at the time when the railroad was endeavoring to obtain wholesale, under its grant, the mineral lands which were specifically excluded from it. The work the Association set out to accomplish, the rebuilding of the hydraulic mining industry and the preservation of the public mineral lands as such, has in the ten years been so far accomplished that completion is largely a matter of detail. Many of the hydraulic mines have resumed operations and others wait on the construction of debris dams, for which the plans are made and the money for construction ready.

The quick response to the community of interest idea, which made the organization of the California State Miners' Association possible, and the clear comprehension of the meaning of the idea which has kept the organization within the lines on which it started, have more than a local and passing interest. Largely they are the growth of the exceptional social and industrial conditions connected with California gold mining. The mines are very largely owned in the local mining communities by men who have made them by working in them. Mine owners and mine workers are not two classes, such as are defined by capitalist and laborer, but are of one class, social equals always, and only temporarily different in the amount of money possessed. The mine owner and the mine worker can, and often do, change places without loss of mutual respect. As a consequence, it is easy for them to unite and pull together, for each mine owner and mine worker knows that he is pulling for himself. Local storekeepers, city merchants and manufacturers have for the larger number at some or other time in the past been California mine owners and California miners. In the Association they have always been with their own. The social and industrial peace that the unity of associations and interests have brought should be maintained here and sought in communities less favored.

The Association meets this year with its history in the ten years that are past. Its main purposes are being accomplished. Lesser ends, such as the obtaining of a national department of mining and the revision of the mining laws, are in the keeping of mighty forces, which here we may inspire but cannot control. New York is re-

organizing mining now, and will have or not have a Secretary of Mines. Senator Stewart is still young, and revision of mining law must wait on his death, when it may be that there shall not be any necessity for the revision.

Assay Returns.

The Los Angeles, Cal., correspondent who writes referring to the editorial in this paper on "Assay Returns" on September 14 is inaccurate in the quotation he makes the basis of a criticism. This paper did not say "that assayers should have a blank form for all kinds of tests, or returns." What it did say was, "There should be one general blank form which would be used for all assay returns, partial or complete." "All kinds of tests, or returns," is not the same idea that is conveyed by "assay returns." The latter has just one meaning, namely, the dollars of value in a unit quantity of the particular mineral or rock questioned. "Tests," to give the word the meaning our correspondent has in mind, means trial examinations of processes for getting the dollars of value out of the particular mineral with a commercial profit, after, by having "assay returns," becoming informed that there were dollars in value to get out.

The making of all kinds of tests is not the business of an ordinary assayer. An assayer may make such tests, but when he does he is not an assayer, but an "expert metallurgist"—not the daily newspaper kind of expert, produced by a lead pencil, but a specialist of the highest class. An assayer may give street opinions, advising a client for whom he has made assays as to processes. Receiving nothing for street opinions, he assumes no responsibility for their correctness. As a fact, such opinions—or, indeed, opinions at all—should only be regarded as suggestive of the direction of initial tests.

Assaying is largely a mechanical operation and some assayers are merely trained to perform the operation. Their work is only expected to answer the question, "How many dollars of value in a unit measure of this mineral?" It is not absolutely unreasonable to assume that the advance of adaptation of mechanical devices to the mechanical part of metallurgy will some time give us machine assaying; a machine into which one can feed the questioned (or questionable) mineral through one slot, a nickel in another, then press a button somewhere, and from a third draw down a blank with assay returns typewritten on it.

The purpose of the editorial which has attracted our correspondent's notice is to standardize assay returns, and aid efficient assayers.

An engineering construction of great commercial interest is reported as having been revived by the Russian Government, which will now undertake the construction of the section of the first located line of the Transsiberian Railroad, following the Shilka and Amur rivers between Stretinsk and Havarovka. This route was abandoned when the shorter Trans-Manchurian line or cutoff, which has been partially constructed, was first projected. During the late Chinese war a large section of this last line was destroyed by the Chinese, but is now being rebuilt. The building of the Amur river line can hardly fail to mean an enormous consumption of structural material from the United States. It can also be expected to have a most stimulating effect on the several propositions, more or less in the formative stage, to manufacture iron and steel on the Pacific coast. By far the cheapest transportation to the place of use of steel and iron is from the Northwest Pacific coast to the mouth of the Amur river at the port of Nickolleff, and thence to distribution by river steamers. The steel can be brought from Russia by the already constructed railroad to Stretinsk, or by steamer via the Suez canal to Nickolleff, but both these routes are long and costly compared to the short Trans-Pacific. Ten years ago a great deal of faith—for there was little that could be considered evidence—was necessary to foresee the development of a great iron and steel industry on the Pacific coast. Now it would create no surprise if the announcement were made any time that the United Steel Co. would immediately construct a great steel making plant in Alaska, or if some great English firm should undertake a similar enterprise in British Columbia.

Concentrates.

WITH a charge of ten tons of slack coal to a coking oven the product is 68% to 75% in coke, dependent on whether or not the coal was washed.

GRAND RIVER, the eastern branch of the Colorado river in Colorado, is the farthest east of any stream whose waters flow into the Pacific ocean.

AN agreement on a common boundary line by one co-owner in a claim does not bind the other co-owners. The reason of this is that co-owners in a mining claim are not partners.

THE production of aluminum in the United States has increased from 150,000 pounds in 1891 to 5,200,000 pounds in 1900. The price dropped from 66½ cents a pound to 32 cents during the same period.

AN alloy of nickel and steel, containing 25% of nickel, both constituents being highly magnetic, is almost entirely non-magnetic. But by great and rapid cooling of the alloy it may be made magnetic.

THE gold receipts for the first quarter of the fiscal year at the United States assay office at Seattle were \$1,874,312, a deficiency over last year's receipts for the corresponding period of almost \$7,000,000.

NICKEL STEEL ALLOYS containing about 25% of nickel have remarkable tenacity, up to 142,000 pounds to the square inch, and have remarkable resistance to injury under rupturing strains that other steels yield to.

THE State laws relating to corporation proceedings should be carefully complied with. Where the laws require the consent of the stockholders to the execution of a paper the records of the corporation should show that the consent was given.

THE Australian blue gum tree wood seasoned will make good mine timbers. The wood is stronger than pine and much less liable to decay. It is notable that, used as piling, the teredo, which by boring rapidly destroys fir piles, leaves it untouched.

THE effect of swelling ground in the tunnels of drift mines in California is compensated for by spreading the timbers at the floor. Whenever the swelling starts to break the side lagging or raises the tunnel floor the rock is cut away, restoring the opening to its original dimensions.

AT the copper mines of Ashio, Japan, the ore is almost entirely a copper sulphide carrying about 19% copper. The total output of sorted ore is about 100 tons daily. The ore is reduced at the mines in brick reverberatory furnaces, using wood for fuel, and in blast furnaces, using charcoal fuel.

A LATE method of water-wheel regulation where several wheels are used for electric power development, which is put on the same transmission line, consists in leaving the water gates fixed and regulating by adjusting resistances in circuit with the dynamos so that the load on each is equalized.

THE statute of May 14, 1898, extending the homestead laws to Alaska is inoperative because the public surveys have not yet been made. The only way in which titles can be granted so far is under the mineral, trading and manufacturing and town site claims, and exercise of soldiers' additional homestead rights.

IF aluminum bronze contains less than 5% of aluminum, tin solder can be used to solder it. If over 5%, a good solder consists of 20% zinc and 15% cadmium. The surfaces are cleaned, a first and second layer of solder is laid on, the excess is removed with a brass scratch brush and the pieces are then soldered as usual.

IN one of the recent trials in Butte, Mont., representatives of the Boston & Montana M. Co. testified to copper ore smelting costs being \$4.78 a ton, while representatives of the Montana Ore Purchasing Co. contended that the cost averaged \$7 per ton, submitting a table said to be made up of the exact costs for a period of ten months.

A SLUICE HEAD of water, as understood by the old miners, was variously 35 to 40 miner's inches. It gave a supply that would fill a sluice box made of 12-inch boards, when the sluice was set on a grade of 10 inches to a 12-foot box length and was having shoveled into it the gravel that the water would wash away without slumping.

AT 5000 feet elevation a siphon can be arranged to clear a slope of water to a vertical depth of 12 feet. Hand pumping that could not hold the water down with 30 feet lift should be able to hold it with only 18 feet lift. The combination suggested is, however, only a temporary expedient. Any power is cheaper in the long run than hand power.

WHILE persons resident in forest reserves, who have not a sufficient supply of timber on their own claims for firewood, fencing, building or mining, may remove without charge timber for their own use for these purposes, application must be made to and permission given first by the Interior Department where the value of the stumpage exceeds \$100.

THE metric system is in compulsory use in twenty countries with 300,000,000 people; the English system in only two, England including some colonies and the United States, with 150,000,000 people. The objection that the metric system would have to be learned is trifling. The 300,000,000 have had to learn it. It might be taken on the installment plan. The measure for liquids could be easily introduced. The litre and quart

are so close together that the change of measure could be made without attracting attention unless the name metric was attached to it. The metric weights already have a foothold in chemistry and assaying.

THE "latest" in cyanide process development is understood to be a method recently patented by the Gold and Silver Extraction Co. of America, Ltd., for recovering the cyanide of potassium that is apparently consumed by copper and iron salts during the treatment of ores containing these constituents. Cyanide consumption in such cases is usually high.

WHILE the period of newspaper publication of an application for patent to a mining claim requires ten publications in a weekly newspaper, thus including sixty-three days, counting the first and the last, the period during which an adverse claim can be filed, the Land Office has ruled, is the exact sixty days allowed by the statute, beginning with the first publication.

THE fact that a particular gold-saving device will save all the fine gold from sand and fine gravel is not so exceptional as inventors are apt to believe. Sand is very much the most favorable material from which to get out all the gold by washing. The real test is with gold in clay. Try the machine on a moderately compact clay and see how much or how little of the gold it gets out.

ABOUT sixty pounds of the coal in coking with by-product ovens becomes coal tar, and about 10% of the coal tar is aniline dye chemicals. The yield of ammonia sulphate from each ton of coal is about twenty pounds, worth 1 cent a pound. The coal tar is worth ½ of a cent a pound. The by-product ovens produce from 15% to 20% more coke from the coal than the old style beehive ovens.

ASSESSMENT WORK on connecting and contiguous claims under the same ownership can be done on any one of the claims if manifestly tending to develop the entire group. Such assessment work must aggregate \$100 for each claim. That is, if a man own say four claims there must be \$400 annual assessment work done to hold them, either \$100 on each one or \$400 on any one of the four.

THE Secretary of the Interior has confirmed the report of the Commissioner of the General Land Office on the petition of Alaska residents to have the location of the land office and Surveyor General's office at Sitka changed to Juneau. The prayer of the petitioners is refused, principally on the ground of economy to the Government. The difference in office rent is \$250 a year in favor of Sitka.

IT is difficult to determine just which is "the banner town of the country for subscriptions to the MINING AND SCIENTIFIC PRESS." Probably Tonopah, Nevada, comes as near the top of the list in this respect as any. Out of a population of 750, there are 110 paid subscriptions. Since July 1, 1901, the names of 617 new subscribers have been received from various parts of this west half of America.

THE general course of the price of silver has been downward since the beginning of the year, when it was 64 cents. In April it was 58½ cents and at the present time is 58 cents. The production in the United States has not changed much during the last ten years. In 1891 it was 58,330,000 troy ounces; in 1900, 59,610,543 ounces; and the average annual production for the period was 56,856,600 ounces.

TO WELD COPPER, treat it first with a solution of nitrate of potassium and a cyanide. It can then be welded either to itself or to iron or steel in the ordinary way used in welding iron or steel. A clean fire of coke or charcoal and a temperature of the copper much below white heat will insure the best result. A higher temperature makes the metal brittle in working, and one too low will not give sufficient fluidity to the flux.

THE railroad from Reno to Virginia City, Nev., during the bonanza days of the Comstock made the largest earnings of any railroad in the world. The White Pass & Yukon from Skagway, Alaska, to White Horse, B. C., is now rivaling its record. It pays 20% dividends and expects to pay 25%. Freight charges are \$120 a ton. Its prosperity can not be taken as the measure of what can be anticipated from the project to unite by rail Dawson in the Yukon and Irkutsk in central Siberia.

IN using sulphur to assist in welding operations the sulphur is sprinkled into the fire before the metals are placed in it and brought to a welding heat. The action of the sulphur seems to be to clean the fire, or the metals, or both, of impurities which usually make welding difficult. By first treating the fire with sulphur before bringing the metals to a welding heat, copper, brass and other metals can be welded as well as iron or steel. About a full tablespoonful of powdered sulphur suffices for one welding operation. The process is the subject of a late patent.

THE overflowing of levees on the Sacramento and San Joaquin rivers in California is not caused by the filling up of the beds by hydraulic mining debris. This cause undoubtedly affects the elevation of the beds of the Feather and Yuba rivers, branches of the Sacramento. The low-water plane of the water flow in the main rivers is very much the same as before mining started and before levees were built. The cause of the overflow is in the construction of the levees themselves. The confining of flood stages of flow in the narrow limits of the levees raises the plane of the flood stages and overtops levees built without taking this into account.

WHERE the getting of lumber in place for a ditch flume is impracticable, there are at least two forms of alternative construction possible. A flume can be made of puncheons or even of poles. These are fastened by wooden pins to flume sills and posts set closer together than when using lumber. The cracks are tightly packed with moss and sediment is run in to make the conduit a better water holder. This method of construction is common in Siberia and is employed in some localities in Alaska. A preferable alternative construction is made by building up a floor grade for the water flow with large boulders and slabs of rock with the openings filled with gravel and clay or earth. The latter is puddled in as the structure is built up. Sides, or rather one side, the outer—the hill slope against which the ditch is built making the other side—are rock walls laid up or puddled in clay or earth in a similar fashion to the bottom. Running muddy water through this ditch for a while makes the bottom of sides watertight. It is necessary to build such ditches on a flat grade so that the water flow takes a low velocity, depositing silt instead of picking it up. There is little pressure on the walls from the water and there are many examples in California of the construction described that have been in continuous use with little repair for nearly a half century.

AN undercurrent is a device for saving fine gold in placer mining. Reference is intended to the type of construction rather than the particular construction associated with hydraulic mining, from which the name undercurrent was evolved. As used in hydraulic mining, it is not a perfect saver of fine gold, though it recovers much that passes the sluices, and very likely nearly all that is free from attachment to particles of clay or other rock. Where not used to handle such large quantities of material and water as in hydraulic mining, it is possible to make the undercurrent a much more efficient saver of fine gold. The undercurrent, if small, such as would be used on a dredger, for example, can be set so that its grade can be exactly controlled. The pulp fed should be screened to as near uniformity as practicable and must flow in a thin, even stream over the riffles. In the latter the water flow should keep the sand quick and free from the condition termed "sanding," where the material becomes tightly packed in the riffles. In this last condition fine gold particles slide over the riffles in the tails. With the sand "quick," the fine gold particles sink into it and are caught by the riffles. It is desirable to have a rod mounted in guides over the undercurrent, with small paddles or stirrers, which can be worked through the sand in the riffles to break up any tendency to sand. The usual manner of setting the cross riffles, the only kind that should be used in an undercurrent, is to place them on edge perpendicular to the bottom of the undercurrent. A very much preferable way is to set them vertical, with top and bottom faced parallel to the bottom of the undercurrent. This gives them a rhomboidal form. The inclination against the pulp flow provides a pocket or dead-water angle, into which the fine gold collects and is not moved out by the in-and-out dipping of the water current. With this form of riffle construction quicksilver is rarely needed to collect and hold the finest flour gold.

THE exact numerical relation between the entry head, the velocity head and the friction head of water flow in pipes is sometimes misunderstood as a result of too close mental dependence on the language of textbooks. The three heads together make the total head, or difference of elevation, between the surface of the water at the inlet end of the pipe and the center of the outlet end of the pipe. The entry head is that portion of the total head which overcomes the resistance to entry of the water and keeps the pipes full. Experiments have determined this to be practically one-half the velocity head. The velocity head is the difference in elevation in vacuo the water must fall through to get the velocity with which it actually flows in the pipe. The friction head is the amount of fall required to overcome the internal resistance of the pipe to the water flow. The entry and friction heads thus balance resistance and the velocity head moves the water. Resistances increase in the ratio of the square of the velocity; consequently, the portion of the total head required for friction head increases with the square of the velocity. The velocity head only increases directly as the velocity. It happens, therefore, that in the free discharge of long pipes, the discharge through the full cross-sectional area, the friction head amounts to nearly all of the total head. Textbooks, commenting on this, state that the sum of the entry and velocity heads rarely exceeds 1 foot. With suppressed discharge, or discharge through an orifice smaller than the full cross-section of the pipe, the relation of the three heads, considered with reference to the water being discharged, changes, the velocity head becoming much the larger portion of the total head. The entry head is lessened and becomes very small, and the friction head becomes relatively small. With a sufficiently small discharge opening, the velocity head will approximate to the total head, the other two becoming eliminated. It must not be forgotten that the basis for these figures is the quantity of water discharged. Practically, the pipe becomes in its relation to the discharge opening a tank or reservoir. With water power installations it is desirable to reach as close as possible the condition in which the velocity head is the total head. The friction head and the entry head are losses which deduct from efficiency. The pipe must then be larger in diameter, relatively, to the discharge opening, in order to reduce velocity of flow in it, and thus reduce the loss by friction head.

Possibilities for Portland Cement Manufacture on the Pacific Coast.

Written for the MINING AND SCIENTIFIC PRESS by
A. H. CEDERBERG, C. E.

In a recent publication my attention was called to the fact that enormous quantities of Portland cement were being imported every year on this coast, one city alone contributing with an amount of 525,000 barrels of cement in one year, and that the present conditions called for an increase in imports rather than decrease. This notwithstanding that the cost per barrel of the imported cement is more than double that on the east coast, where American Portland cement can now be bought for \$1 or less a barrel in bulk at the mill.

The prevailing opinion on the west coast is that none but German Portland cement is worth while considering. This is an opinion which at one time was held in the East, but not held now. The American Portland cements are not one but many brands, and are known to be superior to any foreign Portland cement made.

The United States Government engineers and the American Society of Civil Engineers have officially declared the superiority of the home made article. Six years ago very little domestic cement was used, or even manufactured, while to-day we manufacture at the rate of at least 10,000,000 barrels a year, 80% of which is made within a radius of 25 miles in the Lehigh district, Pennsylvania. The largest consumers are the railroads and the municipalities, and were it not for the high prices on this coast the increase in the use of Portland cement would without question be enormously extended within a very short time. The importing dealers in the foreign cements naturally assert superiority on the uniformity shown by the physical tests of the foreign brands. While the uniformity exists, the claim of superiority is untrue. The physical tests of American made Portland cements show equal uniformity and a higher figure of uniformity. The writer knows of no manufacturers, either in the United States or in Europe, that take such pains and care in the making and testing of every barrel of cement sold as the Lehigh makers of certain brands. A tester of these brands must acknowledge not only the physical uniformity, but also their undisputed superiority to anything made either at home or abroad.

The reason for this superiority of the leading home brands is not so much due to quality of the raw materials as it is to the superior mechanical devices adopted in their respective plants, chief among which must be mentioned, first, the rotary kiln system, originated by Ransome in England, but developed here; second, superior calcining and grinding devices; third, more practical physical and chemical testing.

How important these three items are can be readily appreciated. The raw materials in the Lehigh valley district are practically the same, chemically; nevertheless, the product manufactured at the various plants differs radically, especially on physical testing, while the chemical analysis shows up very uniform. Chemistry plays a small part in making a high-grade Portland cement, when compared to the physical properties, which are the result of superior mechanical devices in treating the product, whether raw or burned. A cement chemist always surrounds himself with more or less mystery, while as a fact the part of chemistry is unimportant contrasted with the more vital physical treatment required to manufacture the cement.

The argument has been put forth that cost of fuel and labor on the Pacific coast is a factor adverse to the economical manufacture of Portland cement. I will admit that the cost quality of coal, plus cost of local labor, would undoubtedly increase the cost of manufacture at least 27 cents per barrel more than in the East, coal being here figured at \$5 per ton and labor at \$3.50 and \$2.50, respectively. On the other hand, crude oil in such quantity as to equal in heat units one ton of best slack coal can be had here for \$2.80—present market price, which is only 25 cents higher than one ton of best Virginia slack delivered at the cement mills in the Lehigh valley district. Add to this the fact that crushing and pulverizing of coal would by the use of crude oil be eliminated, the difference in manufacturing cost would be only in cost of labor; and even here much saving could be accomplished by means of skillful engineering in applying mechanical devices to handle the material. Hence, in my opinion, the cost of manufacture here should under no circumstances be more than 10 cents per barrel higher than in the East.

California is at present very little represented in the cement manufacturing industry. There is in operation one small factory at Colton. Another is now under construction at Suisun, and a third one is under consideration, also in the latter place. While the raw materials are chemically correct for the making of cement in these places, they are, however, not all the best from a mechanical standpoint, a fact which is very seldom taken into consideration. For reasons appreciated by constructing

cement engineers, cement made of materials not the best cannot reach the same standard of excellence developed in the leading brands of the East. California has, however, enormous deposits of limestone and slate rock of the finest quality, and which from the important mechanical point of view would be free from all possible objectionable features. The California limestone seems to be unusually free from carbonate of magnesia, which is an economical advantage of no small importance, especially in the burning process, and there is not the slightest doubt in the mind of the writer that high-grade Portland cement manufactured of such raw materials could be sold at a large profit for \$1.25@1.50 in bulk f. o. b. car at the mill.

The construction of a modern cement mill of 1000 barrels daily capacity, equipped with the best of machinery, costs about \$500,000. The best machinery in the market for grinding purposes is the so-called Griffin mill, with which the Lehigh Portland Cement Co.'s works have had good success, and the ball and tube mills, which have met with marked success in the Alpha, Vulcanite, Lawrence and Whitehall works. The writer is more in favor of the ball and tube mill system, he believing it to be a cheaper one in cost of maintenance.

The size of the mill is important. A mill of 500 barrels capacity is too expensive, the labor bringing the cost up too high. A 1500 or 2000-barrel mill is an economical one compared to a 500-barrel plant, because administration and labor are nominally no higher in either instance.

A 1500 or 2000-barrel plant will cost on the coast about \$600,000 or \$800,000, and require a starting capital, when operation of the plant begins, of at least \$100,000. A cement plant is of enormous profit to the railroads, and for that reason they could be depended on to give any reasonable concessions in the way of freight tariffs, yard facilities, etc., in order to have the pecuniary benefit of handling the increased cement transportation which lower first cost would inevitably bring about.

The Impending Shortage in Platinum Supply.

A law has been proposed in the German Reichstag prohibiting the use of platinum where it can be replaced without serious inconvenience by some other metal, and to limit its consumption to cases where its employment is essential. A writer, discussing the proposed law, warns against the danger of an impending platinum famine. The debate on the bill in the German Reichstag, he says, struck a note of warning regarding an imminent danger, the full importance of which appears not to be fully realized even among those who ought to be most concerned, but the restriction of the use of platinum in one country alone is hardly a practical measure for averting the dreaded consequence of a platinum famine. The problem, he suggests, is one of those that are eminently fitted for an international agreement, and should be carefully investigated by a commission composed of experts from all civilized countries.

On the many uses to which platinum is put, the writer points out the important part it plays in modern industries, although its extensive employment is only of recent origin. Thus, in the great chemical manufacturing processes there are operations in which it is practically indispensable, as, for instance, that of purifying acid, for which platinum retorts are used—each of which frequently represents a value of \$10,000 or more—or various operations on which the accuracy of chemical analysis depends. Even more important is the use of platinum in electrical engineering processes, and in the manufacture of electrical apparatus. Also, as is well known, this metal has a very important function in incandescent lamps. It is, in fact, the only metal known around which glass can be fused. If it be added that it withstands abnormally high temperatures, and that no acids, excepting aqua regia, will attack it, it is easily comprehended that, unless a substitute combining these qualities be discovered, the exhaustion of its supply would have a serious effect upon more than one industry.—Electrical Engineer, London.

At Rouen, France, the chief of the fire department has submitted a proposal to the municipal authorities on the subject of utilizing the tramway trolley wires in connection with the extinguishing of fires. All the principal thoroughfares of the town are provided with electric tramways, and the proposal is that pumps capable of being electrically driven should be installed in a number of suitable positions on the tramway route, to be switched on to the trolley wires, so that the pumps can be used as occasion necessitates. The proposal is said to have been favorably received and is now under the consideration of the authorities.

It is said that the method of fusing the materials for glass manufacture on a hearth by electricity is giving very promising results. The sand, cullet and other substances are fed on to the hearth continuously by an archimedean screw, and the arc is produced by a direct current of fifty volts, but an alternating current can also be used. Considering the low voltage used, the fusion should be very economical, and especially so when the dynamos are water driven.

Gold Mining in the Rossland District, British Columbia.*

By J. J. SANDEMAN.

Rossland, B. C., is situated in the West Kootenay district, and from a geological and mineral point of view it forms a study of great interest. The present site of the town of Rossland was at one time the crater of a volcano from which lava and ashes deluged the surrounding country. The variety of igneous material which covers the district seems to intimate that the eruptions were intermittent and that the volcano itself was of great age. The occasional presence of quartzite or metamorphosed sandstone seems to indicate that a shallow sea existed here, previous to the volcanic outbreak. The district may be roughly described as an area of gabbro, surrounded by quartz-diorite so highly metamorphosed that the contacts are very distinctly defined. The gabbro area, though only about 1½ mile wide, by 4 or 5 miles in length, is one of great importance to the district; for it is in the gabbro, or closely bordering it, that the best mines have been discovered. The Gertrude mine appears to be the only exception from this rule, for 200 feet below the surface the top of a gabbro dyke has intruded and scattered what had promised to be a fine body of ore.

Many erroneous local conjectures have been made about the age of this district. Fossils have been found which geologists declare belong to the Carboniferous period; these, however, serve only to prove that at some time the Carboniferous strata had overlain the present igneous rocks and had been subsequently removed, probably by glacial agencies. The writer has, so far, been unable to obtain any data proving that the fossils have been found in any other location than near the surface or in the upper part of fissures.

Another local controversy has greater justification, and this difference of opinion is in regard to the nature of the faulting which has so much disturbed and contorted the district. Compression, or the shear-zone theory, and elevation and depression have each their supporters. But any engineer who strictly adheres to either theory will soon find himself at fault in more senses than one, for each has been controverted by practical experience. In the writer's opinion, the complex faulting is owing to the following historic sequence of geology: This district, in conjunction with the rest of the Pacific coast, has been subjected to a great upheaval with consequent faults and general weakening of the surface crust. A great thrust from the west probably started the volcanic activity, and the enormous mass of igneous material, removed from below and precipitated on the surface, reduced the support and greatly increased the weight—hence a general subsidence took place, with its accompanying normal faults. The cooling of this great mass caused shrinkage and depression and has caused some of the shear-zone phenomena; but the consequent parallel fissures and reversed faults have been intersected and cut off by previous faulting.

The veins are true fissure veins, the metal in them being the result of metalliferous liquids flowing through them, attacking the country rock on each side, dissolving the rock and gradually replacing it with metallic sulphides. Such being the case, the shoots of ore often fade away into the surrounding country rock, and, there being no well defined walls, the ore is frequently lost. This, with the very irregular width of the veins and their complex faulting, renders Rossland geology an exceedingly difficult problem to mining engineers. Yet, the writer has proved by actual practice that these difficulties may be overcome by careful study; but the conservative mining engineer with fixed ideas, formed from experience in other districts, would soon convert a mine into a worthless hole in the ground.

The principal ores are chalcopyrite and pyrrhotite carrying various percentages of gold, silver, copper and bismuth; but although some ore will run to a total value of \$50 per ton, the majority is of so low a grade that only the abundant facilities of transportation and the comparatively low cost of smelting would justify mining in such a country.

The diorite formation is intensely hard and expensive to work, but fortunately the water is easily handled. Electricity is the motive power, the West Kootenay Company supplying by cable transmission power to run the dynamos at the mines at a cost about 50% less than the same work could be done by steam; this, with the various works lighted by electricity, gives the district a very businesslike appearance, and the surrounding mountains, with their railroads and self-acting trans tipping into the railroad trucks, all bear evidence of practical and economical work.

As it is possible that members of the Institute might be in a somewhat similar district to this, the writer will point out a few matters that might be of use. First, where chalcopyrite changes into pyrrhotite the continuation of the ore is pretty well assured; on the other hand, where pyrrhotite changes into chalcopyrite, it is likely soon to scatter out among the enclosing rocks. When a lode gives out and leaves no visible trace, small and sometimes almost

*Proceedings Inst. Min. Eng., Newcastle-on-Tyne.

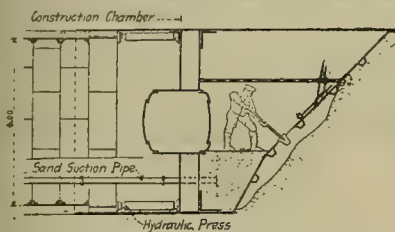
invisible streaks of calcite frequently follow the strike of the lode or run parallel with it. Once, by following one of these streaks a few feet and then crosscutting, the writer found ore where it would otherwise have been certainly missed. The inflow of water in underground workings is no sign of vicinity to a lode, but rather the reverse. Where water proves troublesome, a crosscut intersecting the water flow and conducting it to the nearest fault line will sometimes act as a drain and save much hoisting. Where the gangue of a lode becomes siliceous, the quartz, though apparently worthless, frequently monopolizes all the gold values. The more valuable quartz is clouded by a dark-gray substance; these stains are probably caused by some form of petzite; this, however, is merely a surmise, for the quartz on assay yields no trace of tellurium.

Tunnel Through Sand, Under the River Spree, at Berlin.

A tunnel for a tramway under the river Spree, at Berlin, is driven through mud and sand heavily charged with water. The total length is 2017.2 feet, of which 1490.3 feet are tunnel proper; the grade of the tunnel lies 39.36 feet below the main level of the river, and the least thickness of soil between the top of the tunnel and the bottom of the Spree is about 10 feet.

The tunnel is formed of a cast steel cylindrical shell 4 m., or 13.12 feet, in diameter, made in rings and covered with cement mortar both inside and outside. The exterior layer of mortar is 3½ inches thick, and the inside layer 4½ inches thick. At the bottom of the tunnel is a concrete floor, carrying the rails, and also a drain for taking away any water that may filter into the tunnel. The cylinder rings are 2.13 and 1.64 feet wide; and they are each made of nine plates fitted on all four sides of each plate with inside flanges for bolting together. Between these rings, during erection, flat steel circles are bolted, projecting outward and thus increasing the rigidity of the metallic tube.

The actual excavation is done with an advancing shield and under compressed air. The shield is made of a double, transverse bulkhead, enveloped in a cylindrical hood; the front of this hood being cut away on an angle of 45° to protect the men at work. As shown in the illustration, this hood is closed on



the oblique front by a metal covering, provided with hinged doors, which may be opened at will. The material removed through these doors is thrown into the bottom part of the hood, and is then removed by a sand pump, with its pipes passing through the transverse bulkhead at the bottom. This advance hood is closed in the upper part, so that a space filled with air is left as a refuge for the workmen in the case of a sudden inflow of sand and water. For the same purpose the air lock is placed in the bulkhead which separates the working chamber from the space to the rear of the shield in which the rings are being built up.

The actual construction chamber, in the rear of the shield, is included between the front transverse bulkheads, and a temporary transverse wall of masonry situated some distance in the rear of the shield, and fitted with two air locks—one for men and the other for materials. The steel rings are mounted under the rear of the shield, and the outside cement is rammed in place, the diameter of the cylindrical shield hood being large enough to admit this cement over the rings. This outer coating of cement also seals the working chamber against the sand and water outside. The shield is pushed forward by sixteen hydraulic rams, abutting against the last steel ring put into place, in the usual manner.

This tunnel was commenced in February, 1896, and was finished in February, 1899; but, after finishing 525 feet of the tunnel, the work was interrupted for one year. It was finished without any serious accident, and a tunnel of similar design and 6560 feet long is now under construction at Hamburg.—Engineering News.

NO MORE striking statement bearing on American ascendancy in the steel trade has been made than that contained in an address by Joseph Lawrence, before the Chamber of Commerce of Newport, England, recently. It was to the effect that Mr. Schwab had told him that the United States Steel Corporation could deliver steel billets in England for \$16.50 per ton, whereas the lowest price for which English manufacturers could make them was \$19 per ton, and that when certain ocean transportation arrangements were completed the American price would be still lower, and this in spite of the fact that the corporation's steel workers get more than double the wages paid British workmen in the same line.

A Water Ditch Waste Gate.

Written for the MINING AND SCIENTIFIC PRESS.

The American River ditch, as it is known, takes 1600 inches of water out of the American river, in Placer county, California, about 4 miles south of Auburn. The elevation at the head gate is 450 feet. The ditch lies in the American River canyon for 9 miles, then leaves it to meander among the foothills to a point 2 miles northwest of Folsom, from which the water is distributed in pipes for domestic service and irrigation. The water for the greater portion of the year carries a large percentage of silt in suspension—so much in fact that it has to be settled and cleared before use. This is effected in a number of small settling reservoirs on the line and in the reservoir at the end of the ditch.

The first reservoir was made by building a low dam across a flat valley. This gave a considerable area, but ultimately it filled up with sediment, floating debris and a growth of willows. Increasing consumption of water exceeding the capacity of the pipe main from this reservoir, a new reservoir was built. The water having a fall of something about 60 feet in the mile distance between the old reservoir and the head of the valley in which it was built, a mile of new ditch was built from the head of the valley along the hillside with a fall of 6 feet. At this point, 54 feet higher than the old reservoir, a flat on the side afforded an opportunity to build a new reservoir. With an earth dam built in a half circle, three-quarters of an acre was enclosed. A maximum depth of 8 feet and a mean depth of 6 feet of water was provided. This was sufficient storage to protect the domestic supply during unavoidable interruptions to the flow. From it the pipe delivery had 54 feet more head and served for several years without additional main construction.

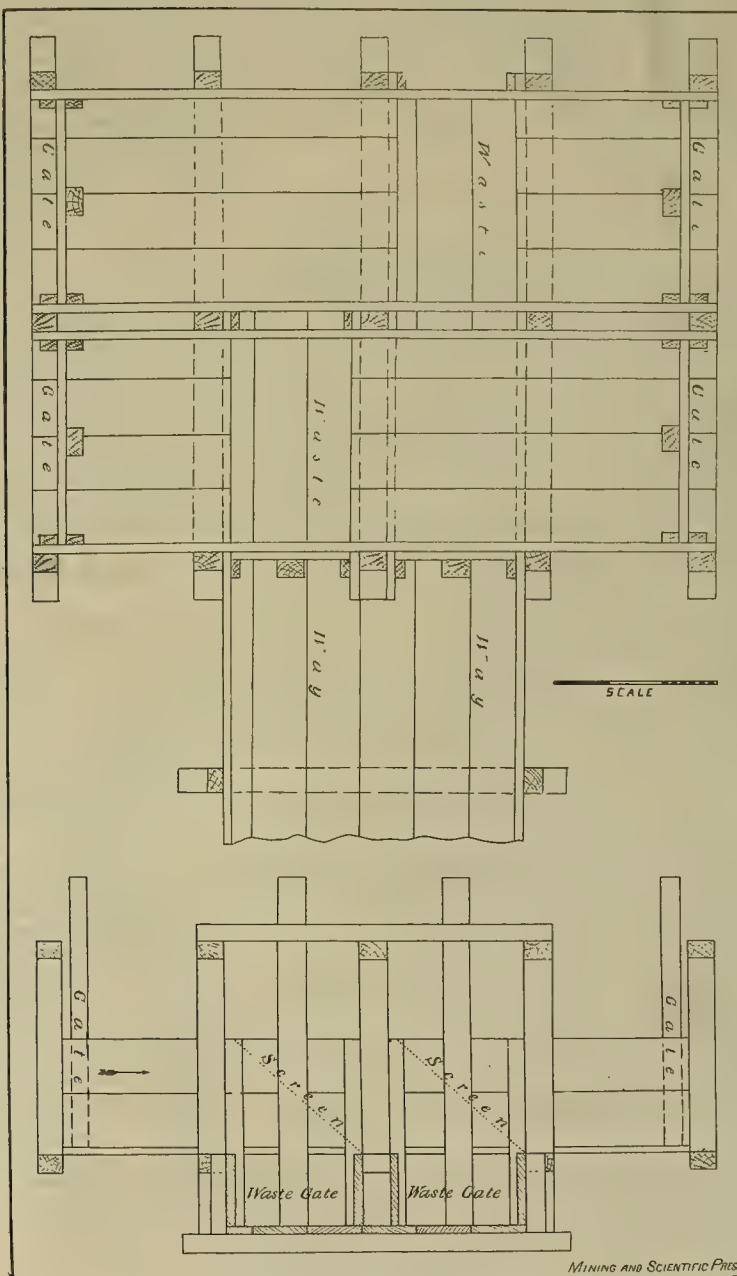
It was impossible to so locate the reservoir that there could be a drop into it from the ditch. The topography forced the construction so that the ditch water surface and the surface of the water in the reservoir when the latter was full was the same. The small capacity of the reservoir and the dependence on it for a continuous domestic supply made it necessary to plan so that it would be kept continuously full. Instead of planning to clean it of accumulations of silt and floating trash, by emptying it from time to time, provision had to be made to keep all such material from getting in it. The system of settling line reservoirs for the silt has already been referred to. One of these was located at the starting point of the last mile of ditch at the head of the valley described.

The silt that passed this last settler had to go to the terminal reservoir. By opening, for a few minutes daily, a waste gate drawing from the bottom of the reservoir, the accumulation of silt was kept down. The hillside above the ditch in the last mile being heavily timbered with pine and oak, considerable quantities of leaves, pine cones and branches came into the ditch and floated down toward the reservoir. To keep this stuff out, the construction illustrated was built.

It consisted of a double box built into the line of the ditch. Each side of the box could by itself carry the entire flow. In service both sides were left open, giving a double cross section for flow, and as a consequence halving the velocity of approach. Each box was provided with a separate waste outlet box and waste gate and each side of the box with gates at both ends. To retain the floating trash from entering the reservoir, screens—woven wire mesh ¾-inch opening, of No. 10 gauge—were set in each side, the bottom in each being on the reservoir end of the waste box outlet. The screens were inclined at 45° toward the inflowing stream. This forced the water flow to rise through the screen, as it were.

Floating trash accumulating and becoming water-soaked would fall off of the screen through the water into the waste outlet box.

When it was desired to clean the latter, one side at a time was taken. First the two end gates were closed down, shutting off the box from the ditch at both ends and forcing all the flow through the one open side. The waste gate of the outlet box of the closed side was then raised. The outflow of the water through the waste box swept with it the leaves, silt and debris generally that had accumulated in the bottom. The reverse flow downward through the inclined screen cleaned the latter more thoroughly than would be the case with the screen set vertical. After one box was cleaned, its waste gate would be closed and the end gates opened, permitting the ditch flow to pass through it again. The cleaning operation would then be repeated with the other side. The construction described has been found in service to work very satisfactorily. The flow into the reservoir is not interrupted by the cleaning of screens, which is unavoidable. Water does not have to be shut off from the ditch, and there



Waste Gate Construction for Ditch.

is no loss of water at all in the cleaning. The debris is carried down a small ravine into the old reservoir, where it accumulates and is burned whenever the accumulation becomes so large as to be troublesome.

Water Power Engineering in Japan.

Written for the MINING AND SCIENTIFIC PRESS.

The imitative character of the Japanese seems to persist and find expression even in the plans of their engineers. The writer a few years since, while in Japan, examined a projected water power proposition in the mountains 35 miles inland from Tokio. The scheme was to generate power there and then transmit it to Tokio as compressed air. The Japanese Government had prohibited trolley car lines, and as most of the power transmitted was intended for city car lines, the Japanese, believing the underground trolley commercially impracticable, proposed to make a compressed air transmission. The water power was to be obtained from a considerable stream

which had a fall of 500 feet in 10 miles. The Japanese engineers planned to divert this water into a ditch—or, rather, canal, for they planned a light grade, making a large cross section—about 4 miles long. At this point it was to be dropped against turbines under 160 feet head. This brought the water down to the stream bed again. Another 4 miles of ditch provided another 160 feet of available fall, which, as at the other point, they proposed to use with turbine wheels. From this point of use the water was to be conducted another 4 miles by canal, and another head of 160 feet was to be used before the water was to be finally wasted back into its natural channel. Noting that there was no engineering reason why the canal should not be built about 12 miles long from the diversion point, and used under 480 feet head, the writer asked the reason for dividing the head into three parts and making three generating stations, where one would answer. In explanation the Japanese engineer exhibited a copy of a foreign magazine giving a description of the Niagara power plant, illustrated. The turbines there operated under 160 feet head, so the Japanese planned to make close copies of that plant, for which they had the technical data. They were not advised concerning high-head power development with the Pelton type of water wheels, and requested the writer to send them the plans of a plant of those wheels working under exactly 480 feet head, so that they would only have to duplicate a construction already made.

The Work of the Engineer.*

It has long been impossible for any individual to give adequate expression to the fullness of the combination of contemporary science, art, knowledge and practice which we recognize for engineering. Engineers constitute more than a profession; they amount to a "race," and it is upon them, more than upon any other class of the civilized world, that falls the heaviest share of the "white man's burden."

There have been framed many definitions of engineering and of the engineer, but none that I can esteem adequate and at the same time sufficiently exact and exclusive. My reason for holding this opinion is based on two considerations. The first is the persistence of much popular ignorance of the nature of our work, and some lack of appreciation of our class; and the second is the stubborn refusal of the English spirit to admit the necessity of any formal qualification on the part of those who claim to be of the profession. With us—odd as such a state of things may seem to our more highly organized foreign colleagues—an engineer may hold a diploma, or he may not. He may be associated with our institution, and be entitled to append a string of capital letters to his name, or he may not possess a single title to nominal distinction. This is because engineering with us does not consist in being, but doing.

The public's unformed, vague idea of an engineer is that of a man who can do things—a great and constantly increasing number of things—all falling within a wide but fairly recognized category. His quality seems to lean more to the side of invention than to that of scholarship. For my part I am content to have it so. Not that an engineer can ever be too deeply instructed, or too well trained in all the elements of knowledge and skill required for the effective pursuit of his calling; but the really great engineer is born, not made.

So subtle is the influence of words upon thought that I could wish the name of our avocation were spelt in English, as it is in languages of more pronounced Latin derivation, with a capital "I" instead of "E"—"Ingeniering," say, in place of "Engineering." Thus the nature of our work would be better recognized among the people, who are careless of etymologies. The suggestion of the name would be removed from association with the word "engine" (a good enough one in its degree, and one that has a wider significance than is now left of it), and would be placed where it rightly belongs, with the root idea which gives us the words "ingenious," "ingenuity," etc.

We must, however, go no further in this direction for the missing definition of engineering or we shall get into the clouds, where, although I am not sure but that we might find some colleges of engineering, we should miss the substance of the thing itself. For engineering is the only high art which depends as much on its cheapness for its excellence as upon any other item in the sum of its achievement.

All other things being equal—adaptability, soundness, efficiency—the engineering work which costs the least money is the best. I do not know of any other product of man's creative powers of which the same can be so truly said. The "cash" basis is the real foundation upon which the engineer builds, and this consideration draws us at once from judging engineering as merely something cleverly done by an ingenious person. It also very often serves to distinguish between college, textbook or rule-of-thumb engineering and the real thing.

At any rate, it places in due prominence a quality which those who regard engineering studies from the

college standpoint are apt to ignore. I have heard a legend of a professor of applied mechanics who was shocked at the thought of steam engines being made to sell for money—like cakes. A good deal of wasted ingenuity would be saved if those who engage in every kind of engineering work would remember to use the money standard, as well as the foot rule and the higher mathematics.

Real engineering must be mastered as it is realized on works in progress. It has no authoritative textbook. The working engineer's library is sometimes largely composed of ephemeral manufacturers' catalogues and lists of prices current of materials. Like the perfect artist described by Longfellow, the engineer must learn to work with the means that lie readiest to his hand. He must cherish his ideals or he will sink into the routine, but he, of all men, cannot afford to indulge in hobby riding. He leaves as little as possible to chance, and, if he is wise, he will not rely upon his best mathematics any further than he can see them. If he starts with aptitude, plods on with patience, observes with insight, records with careful exactitude, and adapts with wisdom, in the fullness of time he will find himself, almost to his surprise, in possession of judgment, and that is the glory of an engineer, fitting him for his highest employ as man-of-all-work to civilization.

Material civilization owes much to this faithful servant. Others may plot, scheme, invent, discover wants and their proper supplies; the engineer, as a rule, does chiefly what he is told wants doing. By strict attention to his own business he helps to make the crooked ways straight and the rough places plain for all. The engineer must have great power for concentration. His solicitude is to make every job a little better than the last. The newest steam engine shows a fractional economy of steam; the latest steamship carries her freight with a scarcely distinguishable saving in coal consumption per ton; the selected railway metal lasts a little longer than the previous purchase; the main line is straightened here and there; and, incidentally, as it were, the remote ends of the earth are brought closer together, and plague, pestilence and famine are driven back.

The wiseacres who declare on political platforms that the effect of modern civilization is to make the rich richer and the poor poorer forget all about engineering. The engineer is the chief of the modern democratic civil service.

Dutch Guiana Gold Fields.

By the courtesy of Mr. S. I. Hallett, manager of the Silver Lake mines, Silverton, Colo., this journal is able to present extracts from a personal letter to him from a friend resident now in Dutch Guiana, in South America. The Venezuela-British Guiana dispute over the territorial right to certain gold fields has made known something regarding the little known country, to which the following notes will add materially:

Local conditions here are not such as to make this a desirable country in which to remain, so you will hear from me again back in the States between now and next May or June.

Regarding the country as a gold country, I would say it contains considerable gold, some of the ground being quite rich, but such attempts as have been made are poorly adapted to its recovery. The deposits are on the surface, still are not placers. A great number of small quartz veins run in all directions, in clay and kaolin formation. The majority of these veins are more or less decomposed, forming a conglomerate similar to cement, with well-preserved crystals of quartz grouted through it. Owing to the flatness of the country, this cannot be successfully sluiced. Long sluices are required to disintegrate the cement, and even then the heavy values remain locked up in the quartz.

The gold is very free and coarse, but requires some kind of a mill to prepare it for amalgamation. The veins are sedimentary, in fissures, and the auriferous deposits cover large areas, so that mining presents more the appearance of making hay than mining. The deposits average about 18 inches thick, covered with 6 to 10 inches of soil and also the closest groves of timber and undergrowth you ever saw.

When operations have been carried on in a small way, some money has been and is being made; but the elaborate plants, so far, have proven a failure. Some of the plants are most elaborate and absurd. One company, at an expense of nearly \$200,000, put in a Florida phosphate washing machine, only to find, when it was ready for business, that they did not have a gold machine at all. Of course, it failed. Then they turned their attention to hydraulics. A large pump, driven by 250 H. P. boilers, throws the water direct to monitors. After running through sluices, the tailings are picked up by a centrifugal pump with 10-inch pipe line and are conveyed some 800 feet and dumped. They handle about 1200 tons per shift and burn eighteen cords of wood. They are washing down a small knoll and have a breast about 100 feet high; 90% of this breast is waste and 10% ore. They run about five months in the year, seven months being dry weather.

Two other companies have put in immense plants,

such as steam shovels, etc. They have been three years getting started and hope to start next year. They have each spent nearly \$1,000,000.

There never has been but a very small amount of legitimate mining attempted, being of the pull-your-leg system. There is lots of gold here, but it is not a country where mining on a large scale can be carried on. Small plants, say, a Huntington or two or a Chilian mill or two, with light boilers and engines, cheaply set up, run in one location for a season, then removed during the dry season to a new locality, can be made to pay good money on the investment; but this is no country, so far as developed, for the heavy stamp mills or extensive steam shovels and hydraulic plants. The expense of transporting machinery in the bush is enormous and can be attempted only during certain seasons of the year. The labor is abominable—the worst I ever saw. The laborers are practically slaves and absolutely worthless.

The placer ground is conceded by the Government and a tax of 5% on all gold taken out is demanded. All gold is turned over to the Government. There is no trouble to obtain concessions, nor is there any trouble to find gold.

The ground on which I am putting up this mill runs \$18 on an average. We have one deposit open for some 200 or 400 feet, 36 inches deep, that averages seven ounces per ton. I have found some handsome nuggets in this blanket. However, the majority of our ore, so far as exposed, will run from \$10 to \$15. We have uncovered this blanket some 4000 feet one way and 2500 feet another. We are still exploring, but the heavy undergrowth makes it slow work; 33½% of this deposit is quartz—just sufficient to cut the clay while going through the mill. I hope to get twenty stamps going by Jan. 1.

The health of the country is far from good. I have just recovered from a severe attack of malarial fever and know something about it. Everyone down here has the fever. It is looked upon as one of the necessary evils. It is not dangerous, but very trying on the system. The weather, of course, is hot, but the nights are cool and pleasant, so that one can stand considerable heat during the day.

But a small proportion of the colony has been explored, and there is unquestionably a great deal of gold scattered over the country; in fact, all the creeks contain more or less gold. I do not think a mining man has ever visited the country, and no attempts at legitimate or systematic work has ever been made.

To S. I. Hallett, Silverton, Colo.
Parimaribo, Dutch Guiana, S. A., Sept. 3.

Possibilities and Limitations of Electric Pumping.*

By LEWIS A. HICKS, C. E.

At the present time electric power may be said to have invaded every field in which pumping finds application, so that the only limitation imposed upon its use is that of relative economy, measured in dollars, which any given combination of apparatus can attain as compared with some alternative device actuated by power other than electricity. Practically every condition ordinarily met in pumping work has been covered in the application of electric power to the numerous pumping machines in use in California, through ropes, belts, gears and direct couplings, and while the disclosures of the Watt meter as to the power consumption of many common types of pumps are embarrassing to their makers, the accurate knowledge now available to manufacturers and engineers of economical results attained by their designs is of the greatest value as a factor in securing better workmanship and more efficient pumps. It is the purpose of this paper to sketch briefly the more important uses of electric power in this connection in California, and to make some comparative statements as to efficiency of performance.

FEED AND CIRCULATING PUMPS.—The element of greater convenience and small unit size often result in the use of steam or air, more especially when the work is isolated, notwithstanding the well-known superior economy of almost any form of power pumps, belt driven. All the advantages ordinarily lost in this way inhere in the electrically driven power pump, however connected, and it is much more satisfactory to carry current to an isolated motor than to pipe steam to the same point. The difficulty of operating power pumps is thus eliminated and shafting dispensed with.

The matter of variation in the volume of delivery can be arranged in a number of reliable methods to be entirely automatic in action, and a little mechanical ingenuity will overcome apparent difficulties and result in the electric service being made the most satisfactory attainable, both in efficiency and reliability, and when our auxiliaries are operated in this manner, the net economy of all kinds of mechanical plants will be greatly improved.

USE OF STOCK PUMPS.—Throughout the central portions of the San Joaquin valley the plane of saturation is within 40 or 60 feet of the surface; and in

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many places where the land is in use for cattle raising, the only resource for drinking water for cattle is the use of stock wells equipped with single-acting brass cylinder pumps, the rods being attached to one end of a walking beam operated from a horse-power sweep. On one of the large ranches in Kern county there are over fifty such pumping stations, each provided with an attendant, usually a superannuated old man, a mule and a shack for both. When the wells can be located within a reasonable distance of each other, the attendant may operate several wells, but his duties are usually limited to keeping the mule in motion enough of the time to maintain the water troughs full at one station.

The fifty wells are scattered over a territory about 12 miles in length and 6 miles wide; and although the wages paid are merely nominal, the aggregate annual outlay for wages, repairs and horse feed amounts to more than \$15,000. It fell to the writer to investigate the possibility of effecting a saving in this direction, and, after considering the relative merits of electric distribution with separate motors and pumps for each point, and of separate gas engine installations, he concluded that the cheaper and most reliable service would be secured by installing electrically driven air compressors at a central point, connected to all the wells with screw pipe. The air at each point was designed to be controlled by floats in the water troughs, operating pneumatic relays, consisting of a simple piston valve, capable of such adjustment as to maintain practically a constant depth of water in the troughs. The height of lift, small amount of power required at each point, and freedom from working parts to get out of order, recommended the Poehle air lift for this service, and a full-size plant was set up in the shop for testing purposes under like conditions to the actual ones and worked very satisfactorily. The expense of operation of the entire plant, costing \$40,000, was estimated to be about one-third of the then annual expense for men and mules, and this figure covered operating expense, interest on new investment and renewals. Initial pressures were determined from the consideration of the required terminal pressure at the well farthest removed from the compressor, together with the economical pressure loss, cost of pipe and power considered. Pipe diameters, leading to wells nearer the compressor on branch lines, were cut down, to use up, as far as possible, the surplus pressure, and where this was impossible, owing to proximity to mains, reducing valves were to be used. Compressors were to be in duplicate, belted to induction motors, and provided with positive valves, actuated by Corliss gear and arranged to cut off the compression of air automatically, as the load decreased by 25% decrements. The distribution required the use of 45 miles of iron pipe, and the sharp advance of this material two years ago to more than double its previous cost prevented the proposed construction.

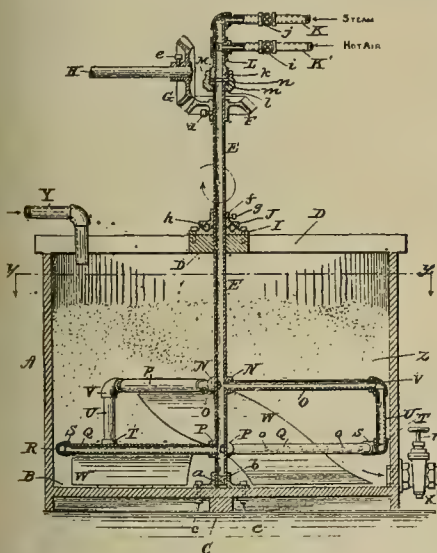
(TO BE CONTINUED.)

Mining and Metallurgical Patents.

Patents Issued October 1, 1901.

Specially Prepared for the MINING AND SCIENTIFIC PRESS.

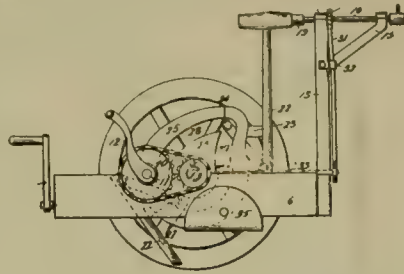
ORE SEPARATOR.—No. 683,412; A. J. Perry, Providence, R. I.



Leaching apparatus, consisting of tub A having outlet pipe X and inlet pipe Y, pipes K and K' having valves j and i, respectively, pipes communicating with branch pipe L, vertical pipe E having a flange m and a closed lower end, coupling M attached to pipe L and having annular flange l, hub N upon pipe E having four side openings, pipes o inserted in hub N, hub P upon pipe E having four side openings, perforated pipes Q inserted in hub P, circular pipe R having branches S into which pipes Q, respectively, enter and also having branches T, pipes U entering branches T, elbows V connecting pipes U and pipes

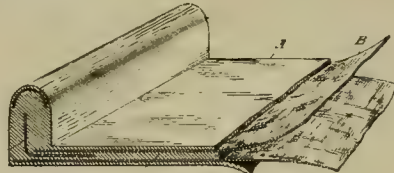
O, curved inclined blades or scrapers W mounted on pipes O, respectively, shaft H rotatable by power and having beveled gear, and beveled gear upon pipe E and engageable with beveled gear G.

ROCK DRILL.—No. 683,533; W. W. Waite, Colfax, Wash.



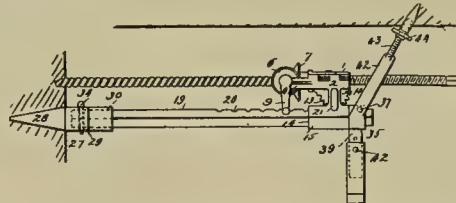
A frame having an upright, a drill shaft mounted in upright and having a ratchet, a second shaft rotatably mounted upon frame, a rock lever operably connected with second shaft, a pawl operably connected with rock lever and in operative relation to ratchet, a rotatable carrier on second shaft, hammers pivoted to carrier, a friction roller carried by each hammer above pivot, spaced plates upon frame having an intervening cam slot in which rollers are received, and means for rotating second shaft to move hammers into striking position and to move them pivotally to engage drill shaft.

CONCENTRATING BELT.—No. 683,547; W. F. Bowers, San Francisco, Cal.



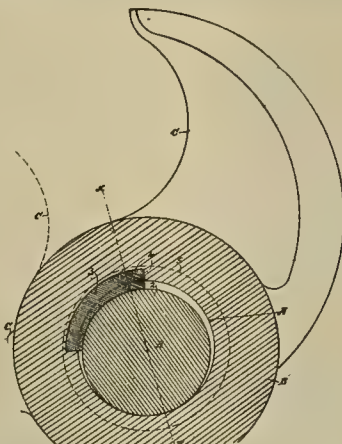
A belt having a flexible body and rubber side flanges, a reinforcing strip of textile fabric cut on bias extended throughout length of belt at sides thereof and extended upward and embedded in rubber side flanges, and of a second reinforcing strip of textile fabric cut on bias embedded in rubber side flanges throughout length thereof at or near top edge of flange.

COAL OR ROCK DRILL.—No. 683,628; I. Wantling, Peoria, Ill.



A two-part boxing and a feed nut, a thread bar and mechanism for actuating bar, a grip-bar support for feed nut, comprising a bar having one edge serrated, a member slidably arranged on bar and having connection with an extension of feed nut having a serrated edge and in such manner as to permit nut to swing in its support, a device for locking member and bar through serrations in bar and extension, an anchor support detachably connected with forward end of bar, and adjustable supporting means for rear end of bar.

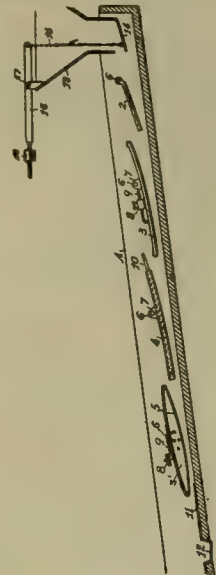
DEVICE FOR SECURING CAMS OR LIKE HUBS UPON THEIR SHAFTS.—No. 683,656; E. H. Moyle, San Francisco, Cal.



A shaft having an eccentric portion and a hub having a keyway concentric with its bore shaft and hub being turnable one with relation to other, and a curved key tapering in direction of its curvature and disposed in keyway of hub and adapted to lock hub

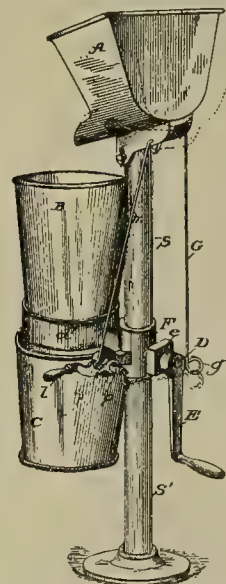
to shaft when one of these parts is turned upon other.

GOLD SAVING APPARATUS.—No. 683,613; A. Marcotte, Gaston, Cal.



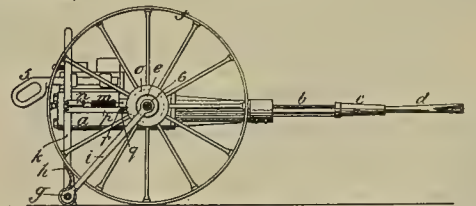
In this apparatus a sluice is employed having plates suspended above the sluice, said plates with convex lower surfaces which rest upon a current flowing beneath. The plates are provided with adjustable counterbalances, and suitable means are provided for supplying material to flow through the sluice. The convex bottomed plates have surfaces which will retain the small particles of light gold or other valuable material which is often carried in suspension, or near the upper surface of the flowing mass, while suitably disposed quicksilver pockets act to save the heavier gold which is carried along the bottom.

ATTACHMENT FOR ORE SAMPLING MACHINES.—No. 683,844; A. C. Calkins, Los Angeles, Cal.



A vertical standard, a frame supporting a rotating bucket, a horizontal driving shaft with a cam, a rocking hopper, a shaker rod attached thereto and bent at right angles at lower end with a coil at angle, and then being extended beneath cam and pivoted to a stationary support, a lever fulcrumed on this support, and a restraining rod extending from lever to hopper for separating shaker rod from cam.

MINING MACHINE.—No. 683,864; H. C. Sergeant, Westfield, N. J.



A drilling cylinder provided with trunnions and wheels for supporting it, a brake shaft and rollers thereon adapted to run on same surface with wheels in rear thereof, a brake on shaft, bars pivotally connecting shaft with cylinder trunnions, a hand lever on shaft, a spring connecting lever with one of trunnions for pressing brake to wheels, a connection between lever and cylinder for limiting movement of hand lever by which brake is withdrawn from wheels.

MINING SUMMARY.

Specially compiled and reported for the
MINING AND SCIENTIFIC PRESS.

ALASKA.

JUNEAU.

The Alaska-Treadwell mine reports for the month ending Sept. 15th 76,763 tons ore crushed, valued at \$71,139, and 1160 tons sulphurets saved, valued at \$43,760. Total product, \$123,738, the ore averaging \$1.61 per ton. Gross expenses were \$65,500. Expense per ton, \$0.8275.

KETCHIKAN.

E. P. Spalding of Kansas City, Mo., has commenced the work of development of the Hicks, Caughrean and Reynolds mines at Helm Bay, which are under bond to the company he represents.

At the Puyallup mine, on Prince of Wales Island, the 2-mile tramway has been completed to Hollis, and twenty-five tons of ore have been brought out and shipped. A chimney of very rich ore has been found. It is claimed that the pay-streak shows assay values of several hundred dollars a ton.

The diamond drill operations at Tolstoi, on property under bond to P. Clark of Spokane, Wash., in the first boring struck the ore body at a depth of about 70 feet.

S. I. Silverman of Copper Mountain says returns from a shipment of 175 tons of ore to the smelter show 31% in copper. At the New York claim the winze from the bottom of the second tunnel level shows 9 feet of ore that runs 30% copper.

VALDEZ.

The Valdez district is rich in copper and has coal, timber and other natural resources. Such is the opinion of J. Day of Spokane, Wash., who has made a prospecting trip in that district. He says that from Valdez extending east for 150 miles is a mineral belt 20 or 30 miles wide rich in copper. The Big Bonanza mine, located 150 miles east of Valdez, has an immense quantity of ore in sight, exposed by a slide, that will run very high in copper. During this summer engineers have made a preliminary survey for a rail line to it. Some development work is being done on this property, and on another mine in the same section a shaft has been sunk 150 feet, a crosscut run and a large body of high-grade copper found. There are also large deposits of good coal in the country, and the blacksmiths at the mines there are now using this local product. There is a copper mine on Virgin bay which has been sunk to a depth of 250 feet and is shipping ore.

ARIZONA.

COCHISE COUNTY.

J. M. Hawkins of the Cochise M. & M. Co. has returned to Denver, Colo., from the mine, which he has been inspecting with a view of building a 100-ton smelter. Mr. Hawkins states that \$20,000 to construct the smelter has been raised, and that the company is carrying on a number of experiments to determine the best process to use.

The new combination shaft at the Tombstone mine is down 450 feet and is being continued by three eight-hour shifts toward the 600-foot level, where water will be struck and the ore body penetrated. When the water shall have been reached a system of pumps will be installed and systematic exploration begun. An 800 H. P. boiler, weighing 45,000 pounds, has been ordered and the pumps have been specially constructed to have a capacity of 1700 gallons per minute.

GILA COUNTY.

The Arizona-Colorado Copper Belt & G. M. & M. Co. has been incorporated by Denver, Colo., people, to mine near Globe, Arizona. There are several shallow holes on the claims which show good ore, and a vein of copper ore 2 feet wide, samples of which average 15% copper, besides other values. The company will commence work in a very short time and propose to sink a shaft on the vein to the depth of 200 or 300 feet. J. F. Hechtman will be resident agent at Globe.

GRAHAM COUNTY.

Fleming Bros. of Tucson make a report of a gold discovery 70 miles north-east of Tucson, in the Galluro mountains, in a vein, according to their statement, 200 feet wide and exposed in outcrop for 6000 feet. A canyon cuts through the vein 200 feet deep, exposing ore on both sides the entire depth of the cut. They assert that from the bottom of the canyon to the surface the outcroppings of ore will run from \$5 to \$100 to the ton.

MARICOPA COUNTY.

A ledge of silver-bearing ore 20 feet wide has been discovered at Wickenburg on the Sahuaro property, owned by Nickless, Miller & Brennan. The new find was uncovered by chance and 3 feet below the

surface many large chunks of native silver were picked up. The best specimen was a chunk of ore about 10 inches square, so heavy and rich in silver that no man in the camp could lift it.

YAVAPAI COUNTY.

J. Berry has leased his Lincoln mine, Walker district, near Prescott, to Abernathy & Buell. The ore is claimed to run from fifty to eighty ounces of silver and up to \$10 gold.

H. McCrum and W. C. Parsons have sold to D. M. Hood for \$150,000 the Gladstone and Sink to Rise mines near Prescott.

CALIFORNIA.

ALAMEDA COUNTY.

The success which the mining of iron pyrites on the Beamer ranch, near Leona Heights, Oakland, has made, has started the Realty Syndicate, which owns thousands of acres near by, prospecting for pyrite deposits. A lead has been struck which it is thought will pay. Fifteen men are at present working night and day on the tunnel. The Stauffer Chemical Co., which is working the deposit on the Beamer property, is shipping two or three cars of ore daily by the electric road to its works near Pinole. The supply is practically unlimited and is considered valuable, as the price of sulphur has increased. The deposit is the closest on the coast to the chemical works. Supt. Storch, in charge of the work at Beamer's ranch, states that his company had also been offered a contract to supply fifty tons a day for three years.

At the Amador-Phoenix mine, J. E. Dye superintendent, the new hoist has been completed and sinking resumed. Three shifts of two men to the shift and two engineers will be employed. It is expected to have the mill ready for operating in two or three weeks.

The Amador County Miners' Association, at a meeting held on the 9th at Sutter Creek, elected twenty-seven delegates to the California State Miners' Convention and re-elected J. F. Parks president of the association; W. A. Pritchard was elected vice-president; J. E. Dye, secretary, and M. Brinn, treasurer.

CALAVERAS COUNTY.

Work has been commenced on the Last Chance mine, at Hodson, and a shaft will be put down. D. Cabrera of Hodson is Supt.

The Utica mine, at Angels, expects to close down about Oct. 15th, to repair the ditch and flume, and also to do three weeks' necessary work on the mines there.

The Lone Star mine, near San Andreas, operated by the Farrington G. M. Co., has been shut down by Manager Pugh.

Supt. O'Neill of the Del Monte mine, near West Point, reports the tunnel in 280 feet from the shaft.

The Melones M. Co.'s dam at Robinson's Ferry has been completed under the supervision of W. C. Ralston, and six hours after closing the floodgates the water was running over the crest. Work upon the flume begins at once to convey the water to the 120-stamp mill at Robinson's. The management expect to be crushing ore Jan. 1.

EL DORADO COUNTY.

Supt. W. E. Thorne, of the Gold Bug mine at Georgetown, is preparing to install a hydraulic elevator on the property.

Operations on the Zantgraf mine, Auburn P. O., have been resumed, after having been closed down since the first of June. The Montauk M. Co. has sold the mine to Eastern people. Timbering and cleaning out the mine is being done preparatory to sinking. A. B. Eastwood, formerly of the Hathaway mine at Ophir, is acting Supt. D. H. Coles, representing the Eastern owners, is at the mine.

KERN COUNTY.

The combination of Kern oil companies, it is said, is about to be completed. The question of entering the combine with a capital of \$40,000,000 is being submitted to the stockholders of the several companies. The combine will control from 65% upward of the output of the Kern field, while of the remainder a considerable proportion is said to be contracted for a series of years, leaving but a small percentage outside free to compete. The combine will be able to control the price of oil up to a certain point. Its policy is declared to be to place the price in the Kern River field at least as high as 50 cents.

NEVADA COUNTY.

The Gold Flat Eureka at Grass Valley, closed for over twenty years, has been reopened. Supt. B. W. Hosking is sinking a new two-compartment shaft toward the 600-foot level.

Supt. Mallen states that in sinking the shaft at the Brunswick mine from the 1000-foot level over 100 feet has been accomplished. The shaft will be pushed down to a depth of 1250 feet before any drifting is done.

In the Seven-Thirty mine at Grass Val-

ley a strike has been made of a rich shoot of ore which shows much coarse gold. It was made in the 200-foot level, the ledge being about 6 inches in width. A heavy copper streak follows the foot wall which is of considerable value. The owners are M. D. Morrison, J. Frandy, D. Voss, J. Norton and C. J. Bryant of Nevada City and J. Riley of Grass Valley. They have the mine on a bond.

C. M. Root has started up the New Independent mine, on Wolf creek, above Moore's Flat. Some new machinery is to be installed.

Operations at the Stiles mine in Nevada City have been suspended temporarily. J. C. Rich, from whom the mine was bonded, has taken possession of the property on account of the failure of the bondees to make the payment which was due on the first of the month.

PLACER COUNTY.

Developments at the Central quartz mine, near Towle, continue to show a fine ore body. New machinery is being put in the mill.—The Pioneer-Linn G. M. Co. are having their dam repaired, ready to commence operations at the Pioneer quartz mine. G. H. Stone is Supt.—A new tunnel is being run on the ledge at the Southern Cross quartz mine. They have encountered some very rich ore.

SAN DIEGO COUNTY.

London people have bonded the American Girl mine, 6 miles from Ogilby. It consists of six claims on well-defined veins of gold-bearing, free-milling ore, of which an enormous quantity is claimed already blocked out. The mine is owned by H. H. Markham, G. C. Coffin and F. S. Daggett of Pasadena and D. W. Field and T. Johnson of Los Angeles. The price in the bond is said to be \$2,000,000.

SHASTA COUNTY.

A. Bell and A. G. Boggs of Redding, owning the Golden Star, Golden West, Bell, Flambeau, Caballero, Alcalde, Boom Ledge and Stone Arabia claims, on Mule mountain, have consolidated under the name of the Golden Star group.

G. J. Heath, of Buckeye, is owner of a rich quartz ledge in the town of Buckeye, from which he is shipping a heavy sulphureted ore to Keswick to be smelted. Some of the ore is so rich in free gold that the gold is obtained by pounding it out in a mortar.

At the Corinne mine on Salt creek, Watson & Watson, who have a lease from E. P. Connors, are taking out ore that, sold at the smelter, nets them \$20 per day. The Corinne is one of the Connors group and has been operated by Connors & Son for several years.

SIERRA COUNTY.

Mining will be resumed this fall in the Wild Boar mine at Gibsonville. A power drill will be put in.

SISKIYOU COUNTY.

Development work on the Pumpkin Roller quartz mine, in the Soda Creek district, near Dunsuir, has produced ore which assays \$6.60 gold and some copper and silver. Over 600 feet of tunnel has been run. J. E. Childers and L. C. Drake last week finished a contract for 150 feet, and will commence another contract soon for 50 feet more.

Trowbridge, Burns & Mann of San Francisco have bought the Carter, or Black Hawk, quartz mine, at Oro Fino, which they intend opening up, and have leased the Johnson quartz mill for crushing the ore taken out.

SOLANO COUNTY.

A. A. Dickie has sold to J. Rosenfeld's Sons of San Francisco 140 acres of land located about 5 miles northeast of Suisun. It contains deposits of lime rock, the extent of which has been determined by sinking shafts and drilling test holes under the supervision of R. H. Doolin. A deposit of blue clay underlies the lime rock. The Eureka Portland Cement Co. has been incorporated by J. Rosenfeld's Sons, Pope & Talbot, Goodall, Perkins & Co., and J. D. Spreckels & Bros. Co., capital \$1,000,000, and will erect cement works with a capacity of 1000 barrels of cement daily; they will employ about 300 men. The price paid for the Dickie property was \$20,000. In addition to the land, rights of way have been secured over adjoining tracts a distance of 2 miles to the Southern Pacific Co. tracks for a private railway.

TRINITY COUNTY.

D. Pesenti is making a prospecting trip to the Hay Fork district with the intention of seeking deposits of platinum, which he believes exist there.

TUOLUMNE COUNTY.

At the Republican mine, at Jacksonville, the shaft is being changed to provide for a skipway in both compartments. The ditch is being cleaned and the mill overhauled.

At the Clio mine, at Jacksonville, a working tunnel is being driven to strike the ledge about 225 feet below the hoist-

ing works. A. Keith, foreman, is in charge of the mine.

Supt. A. C. Morrison of the Crystalline mine, near Jamestown, has the new ore bin receiving rock and the tramway to the mill is completed. Other mine structures and the 10-stamp mill have been put in readiness to begin milling. Hoisting and compressor engines are run by steam, oil being used for fuel; the mill by electric power.

The hoist construction on the Golden West mine, at Sonora, is completed and sinking from the tunnel level commenced. The tunnel, now in 1125 feet, is being extended.

The Rhode Island mine plant, near Sonora, is being prepared for the resumption of work. The boilers have been reset and a new pump will be placed at the bottom of the 450 shaft. At the 400 level a pump of 200-gallon capacity is already installed.

A large amount of gold—reported many thousand dollars—was taken out of the Bonanza, the pocket mine situated in Sonora, about the first of the month.

W. D. Bannister is arranging for putting in working order the Columbia marble quarry. The rough rock material will be shipped to San Francisco and there sawed and polished, for which purpose a mill will be erected.

COLORADO.

BOULDER COUNTY.

The Delano mill at Boulder, for the treatment of gold and silver ores, with offices, ore houses and other buildings, occupying about five acres of ground, was destroyed by fire on the 8th inst., with a loss of \$100,000, partially insured. The mill was owned by Rhode Island capitalists.

CHAFFEE COUNTY.

The sinking of the new shaft in the Bassick mine, near Silver Cliff, a farther distance of 900 feet has been let by contract to be completed in six months—an average of 150 feet a month. To accomplish this, drifts will be run from the old shaft at different levels, under the new, and several crews of men will be engaged in sinking and upraising until the work is completed. It will require nice surveying to make the several workings connect up so as to make the perfectly perpendicular shaft.

The Eclipse mine at Monarch has a reduction works proposed for construction to treat the low-grade ores. J. C. Mitchell is president and B. Disman secretary of the company.

DOLORES COUNTY.

D. Campbell, S. Snyder and J. Lumsden, in the interest of the Remington M. & Power Co., have been examining a \$50,000 plant for mining on the Dolores river. J. J. Lumsden of Grand Junction has the contract for placing the machinery. Two water wheels of 250 H. P. each will be used to lift the water up 800 feet. The placer grounds on the Dolores have been worked in a crude way for years, but, with improved machinery, the Remington Co. expect to work on a large scale.

GILPIN COUNTY.

Shipments of smelting ore, tailings and concentrates from this county for September are 5716.5 tons. The various mills at Black Hawk and elsewhere in the county have all run full time during the month. The shipments from Black Hawk for September this year, as compared with September last year, show a gain of 92.5 tons. It is estimated that the average value of the ore sent to the smelters will run \$50 to the ton, making an estimated gross value of \$285,800. The banks have shipped mill gold to the value of \$245,000.

GUNNISON COUNTY.

The Augusta mine, 12 miles north of Crested Butte, which has been closed down on account of the low price of silver, is now being reopened by the Woods Investment Co. of Cripple Creek, who have bought it. A tunnel has been started to enter the vein 1200 feet below the present workings, and machinery, including an air compressor, is being installed. The McKenzie group, near Pitkin district, has been sold to Denver and Eastern people for \$25,000. The group is composed of the McKenzies Nos. 1, 2 and 3, and has been under bond to A. Hartman and A. Lejane for the past year.

The Vulcan M. Co. is unwatering the Vulcan mine, at Gunnison, preparatory to resuming operations. The shaft on it is over 400 feet deep.

HINSDALE COUNTY.

J. Fitzgerald of Leadville has purchased the Independent mine, on Henson creek, Lake City, for \$50,000—\$5000 down. The seller is R. E. Peniston, who bought a three-quarter interest for \$1000 a few months ago.

LAKE COUNTY.

There are at Leadville several new manganese producers lately shipping, and the

manganese output, which was on the decline, will amount to over 6000 tons a month, the most of the ore going to the Illinois Steel Works. The Caribou mine is one of the new manganese producers. The Sixth street shaft, the Fairview, the All Right and the Colorado are all shipping some manganese at present.

The output from the mines in the Leadville district for September was between 60,000 and 62,000 tons, at a value in the neighborhood of \$1,000,000. The tonnage is somewhat less than that of previous months, owing to the fact that the smelters were unable to handle the sulphide ores.

MINERAL COUNTY.

The American Sulphur & M. Co. has started up its new retort and commenced operations. The refining plant at Creede is quite extensive.

SAN JUAN COUNTY.

The impounding of the tailings from the Silver Lake mill in Silver lake, at Silverton, has been going on for many years, and is slowly but surely crowding the water out of its 200-foot deep basin. This was done with a view to ultimate treatment of the tailings when a new mill should be erected. Now that the great mine has new owners and S. I. Hallett, the manager, is remodeling the terminal mill, it is understood that he will arrange for the treatment of these tailings.

TELLER COUNTY.

During September the output of Cripple Creek mines, as compiled from the returns of the different mills and smelters, was as follows:

| | Tons. | Per Ton. | Value. |
|------------------------------------|--------|----------|-------------|
| Colo.-Phil'a and Standard..... | 24,000 | \$28 | \$ 672,000 |
| Dorcas..... | 2,300 | 25 | 57,500 |
| Economic..... | 4,100 | 33 | 135,300 |
| Miscellaneous including Atlas..... | | | 29,700 |
| Smelters..... | 21,500 | 65 | 1,397,500 |
| Totals..... | 53,300 | | \$2,292,000 |

The companies that paid dividends and the amounts are:

| | |
|-------------------------|-----------|
| Elkton..... | \$ 75,000 |
| Free Coinage..... | 120,000 |
| Gold Coin..... | 30,000 |
| Strong..... | 25,000 |
| New Zealand..... | 7,650 |
| Consolidated Mines..... | 19,000 |

Total.....\$276,650

The lower levels of the Isabella mine at Cripple Creek have been abandoned and the pumps drawn. The official statement gives as the reason inability to find ore in the fourteenth level of paying commercial value in quantities to warrant a continuance of the expensive development work.

The Atlantis Mines Co. has taken up its bond on the Santa Rita claim at \$100,000. The bond had run eleven months and had seven months more. The money, which was paid to the Santa Rita G. M. Co., was obtained from the property, with \$50,000 besides and the money expended for labor.

No lateral work is to be started on the Bostwick claim at Cripple Creek until a depth of 500 or 600 feet has been attained. The shaft is now down 230 feet. At 500 feet a crosscut will be started southeast to meet the Thompson vein of the Elkton Co.

A rich strike is reported in the 700-foot level of the Elkton at Cripple Creek. It is said that in the 5-foot vein a 3-inch streak of sylvanite has been opened that gives average values of \$5000 a ton, and on each side of the streak are 2½ feet of rich rock that will run several hundred dollars a ton.

F. F. Castello, F. L. Ballard, G. L. Keener and M. S. Herring of Cripple Creek have incorporated the Sunset-Eclipse G. M. Co. in Wyoming, to take over the Sunset and Eclipse mines at Cripple Creek.

At a meeting of the directors of the Free Coinage M. Co., held at Denver, W. C. Neville of Altman was elected president in place of the late S. Strong, and A. H. Martin of Denver was elected secretary. The company owns a large group of claims on Bull hill, Cripple Creek, and the main workings are now producing about 300 tons a month. There is a large area of the company's ground which has not yet been explored. The company is a close corporation.

IDAHO.

ADA COUNTY.

The El Paso mine, at Pearl, operated under the management of G. Mitten, is shipping ore to Boise to be tested. The ledge is said to be 14 feet wide. It is opened by a tunnel which is in 350 feet.

A. Charlebois of Montreal, Can., and I. B. Perrine of Blue Lakes, have completed arrangements with R. W. Paris of Boise for the complete hydraulic mining equipment of placer mines on Snake river

owned by a company in which they are interested. The water from Blue lakes will be piped across Snake river.

BINGHAM COUNTY.

The Cariboo G. M. Co. has been incorporated at Mercur, Utah, capital \$500,000, to operate the Roosevelt Nos. 1, 2, 3 and 4. A. L. Castleman is president and T. B. Wilde secretary, with office at Mercur.

The Blackfoot M. Co. has been incorporated at Mercur, Utah, capital \$500,000, to operate the Golden Gate Nos. 1, 2 and 3 claims, in Mt. Pisgah district. G. Z. Edwards is president and G. W. Luft secretary and treasurer, with office at Mercur.

G. W. Bredehoft, manager and principal owner of the Daisy mine, at Neal, reports that the shaft is now down 210 feet. The vein has been explored and the shaft will be put down 75 or 100 feet farther.

F. Hunt, Supt. of the Pittsburgh M. Co.'s properties at Cariboo, reports the development at a point 400 feet from the mouth of the lower or main tunnel of nearly 3 feet of ore, which shows a large amount of free gold in spots and mills an average of \$50 per ton. The new mill is being equipped rapidly. The Pittsburgh is controlled by A. L. Castleman, T. B. Wilde and M. Mahnen of Utah and Eastern investors.

BLAINE COUNTY.

A. Wilson of Martin says that at Lava Creek three groups of claims are being opened and several individual owners are operating. W. Darlington, who has a year's bond on Wilson's group, has discovered a new vein which he has crosscut 44 feet without finding the footwall. Assays run up to \$7.44 in gold and 36 ounces in silver.

A strike is reported from the Black Cinder group of mines on the Hailey gold belt. The vein is claimed to be 18 inches thick, of solid galena ore that assays between 600 and 700 ounces in silver per ton.

CUSTER COUNTY.

The White Knob Copper Co., at Mackay, are working over 200 men. Work is being pushed on the 600-ton smelter. The company are also putting in an electric line to the mines to haul the ore to the smelter.

IDAHO COUNTY.

M. A. Ellis, owner of a one-fourth interest in the Wild Rose mine, near Pierce City, reports that the latest cleanup for a five days' run of the prospecting mill is twelve pounds of gold bullion, worth \$1732, taken from twelve tons of ore. At the bottom of the 70-foot shaft he says there is 12 feet of ore, with three rich streaks, averaging 18 inches each. The Wild Rose Co. expect to put in a large mill next spring.

H. Willison, of the Ohio-Idaho M. & Dev. Co., which has bought the Orion mine, at Pierce, says the company has commenced development work. A large hoisting plant has been installed and the main shaft is now down 300 feet or more.

KOOTENAI COUNTY.

The Sunday Morning shaft, at Tyson, is now down about 100 feet, of which 25 feet was driven through solid iron capping. At a depth of 37 feet a 3-inch stringer containing free gold was crosscut. C. Tapings is Supt.

J. W. McNeil has bought a half interest in the Pearce placer claim, at Tyson, and with Mathews & Schrader, the owners of the other half interest, will work the property this fall.

W. H. Rambo and associates, who are owners of the Jumbo and Little Hero placer claims at Tyson, will work twenty-five men when the season opens.

J. Dugan has men at work clearing his claim, preparatory to operations on a large scale when the rains come.

MONTANA.

BEAVERHEAD COUNTY.

The Polaris mine, at Polaris, under bond from J. E. Morse of Dillon to J. E. Rickards and J. Maginnis of Butte, has been closed temporarily, it is said, while Supt. Van Zant is absent to procure additional machinery.

NEVADA.

LINCOLN COUNTY.

The Quartette M. Co. is developing on the new 500-foot level at the mine at Searchlight and has opened a large ore body. The mill at the river has been closed down pending the addition of fifteen stamps and the building of the 12-mile railroad from the mine to the mill. Grading is completed and steel rails are being laid. The Searchlight mine has been idle for months, but is now being started up again.

The Piute Valley G. M. & D. Co. has been incorporated under Delaware laws to mine at Searchlight, where the company owns the Domestic, Quaker Girl, Tripod, Bonanza and Shawnee claims, on which considerable development work has been done. Three of these claims show a

good grade of free gold ore. F. L. McKee of Plymouth, Penn., is at the head of the company. D. E. Miess is superintendent of the company's mines at Searchlight.

The Wilson M. Co. is sinking on the Louis Mountain mine. E. J. Coleman is Supt.

The El Vira claim, recently bonded by Los Angeles people from T. D. Forney, is to be opened up at once by sinking a shaft.

LYON COUNTY.

The California company that has taken a \$2000 bond on the Lizzard mine, below Dayton, is preparing to install a milling plant on the Carson river below what is known as the Coone ranch.

WASHOE COUNTY.

A mill test is being made of ore from the Forlorn Hope mine at Olinghouse. The ledge in the Forlorn Hope is 7 feet wide. Returns from a small shipment to Salt Lake gave \$70 per ton.

The mill at the Hully-Logan mine in Como is operating five stamps, as the cyanide plant cannot handle the full crushing capacity of the mill.

The Gold-Copper Ex. Co., an Eastern company, of which C. Norcross is president, has made a strike in the Norton-Bidwell claim at Pyramid, where the ledge was opened by an 80-foot shaft and a 70-foot drift. Where cut the ledge is 15 feet wide. Several feet, it is claimed, will run \$20 a ton, and a smaller seam, several inches wide, assays \$115.48. The ore is free milling.

At the North Star mine, owned by Nelson & Williams of Reno, a crosscut has been run from the shaft and the ledge found again.

Cutts, Norcross & Pothoff are developing their Copper Queen mine, 3 miles northwest of Reno. The ledge at the bottom of a 50-foot shaft is 12 feet wide and carries a pay streak 4½ feet wide, nearly all of which is shipping ore.

WHITE PINE COUNTY.

J. A. Snedaker, E. L. Giroux and D. E. Shear have sold the Ely mine to St. Paul, Minn., Burlington, Iowa, and Eau Claire, Wis., people. J. Giroux, manager of the United Verde copper mine, is to manage this property. The mine comprises fifty claims carrying copper and gold, the copper ranging as high as 30%. Plans are being prepared for a 400-ton smelter. A railroad to Eureka is projected.

NEW MEXICO.

DONA ANA COUNTY.

Copper has been found in the Potrillo mountains, also gold, silver, lead and a fine quality of marble. It is claimed that placer gold exists in them. E. A. Chaffee and Lewis Goodman of Las Cruces have a marble claim and are preparing to open a quarry. F. L. Oliver, of Las Cruces, has several copper claims and is doing considerable development work.

GRANT COUNTY.

A. E. Dawson has commenced shipments from the Anson S. at Fierro. A steam hoist is to be erected.

Crumbine, Knolton & Cornell are tunneling on their mine at Pinos Altos and claim to be taking out ore, largely native copper.

Dimmick Brothers are taking out high grade silver ore from the Silver Cell mine at Pinos Altos. Much of this ore runs several thousand ounces to the ton. The Dimmick smelter is expected to be started up soon.

The Clifton Copper Co. at Santa Rita has its 100-ton concentrator completed. The company has commenced sinking a large double-compartment shaft, to be the permanent working shaft.

SAN MIGUEL COUNTY.

A number of good claims are being worked in the Rociada mining district, which is about a year old. Kelley & Jumbach are working the Azure mine and are down 50 feet on a 7-foot vein of copper glance ore. The Rociada G. & Copper Co., with J. L. Matt as manager, is down about 175 feet and is taking out ore. Bolock & Kelley have a vein about 90 feet in width, which gives good values in gold, silver, lead and copper. The shaft is down 85 feet.

SIERRA COUNTY.

The New Era mine, near Chloride, is being developed under L. Terry, manager. Mine buildings have been completed and a raise to connect the lower tunnel with the upper workings is under construction. Shipping ore is being sacked from the raise.

J. F. Lucius, who recently bought a lead mine near Rincon, has sunk a 70-foot shaft on it and uncovered a 3-foot vein of copper, ore from which averages 26% copper.

SOCORRO COUNTY.

The Little Charlie, Combination and Little Giant, at Cooney, are on the extension of the Little Fannie vein. At two

points of development in the Little Charlie a strong vein is opened and at one point the work is believed to have already tapped the rich ore shoot which has given value to the adjoining mine.

The Helen M. Co. has resumed operations at the Confidence mine, at Graham, where it has been installing new machinery. The deepest working in the mine is now down 987 feet. It is intended to sink to 1200 feet with the present hoist, when it will become necessary to put in another.

VALENCIA COUNTY.

The Zuni Mountain C. Co. has located twelve claims near Copperton, 18 miles west of Grants. Several hundred feet of development work has been done. A copper smelting plant is to be erected. W. J. Black of Santa Fe is president of the company.

OREGON.

BAKER COUNTY.

P. A. Campbell of the Flagstaff mine, at Baker City, proposes to reopen and develop the mine, starting the work now.

JACKSON COUNTY.

Davidson Bros. of Jacksonville have sold a quartz claim, situated near the head of Ward's creek, to O'Neill, Meade, Landreth and Shoup of Baker City for \$3000. This property was discovered and sold by the Davidsons inside of a month.

D. J. S. Pearce & Son of Jacksonville have bonded the Access mine, in Poorman's Creek district, to R. Bond for \$10,000. This ledge is several feet wide, with ore which assays from \$3.75 to \$9 in gold per ton.

G. Hoffman and F. J. Bolt of Jacksonville have had several tons of ore from their ledge on Tallow Box mountain worked in an arrastra, obtaining \$50 a ton.

MARION COUNTY.

Colorado Springs, Colo., miners have been prospecting a mine of gold-bearing quartz, 10 miles north of Detroit, and it is reported that they are getting very satisfactory results.

SOUTH DAKOTA.

LAWRENCE COUNTY.

The York claims, at the head of Friday gulch, near Hills City, have been sold to a company consisting of Chicago and Deadwood people. The ore is high grade and free milling. There is a small shaft on the property, but the new company will sink it deeper.

UTAH.

BEAVER COUNTY.

The Bluebird Copper-Gold M. Co., Ltd., incorporated in the State of West Virginia to do mining, smelting and numerous other lines of business, with offices in Syracuse, N. Y., propose to do copper mining in this county. P. A. H. Franklin of Salt Lake City, M. J. True of Buffalo, N. Y., C. S. Hutchinson of Syracuse, N. Y., and J. Kittinger and F. A. Fox of Buffalo, N. Y., are the incorporators. C. C. Dey of Salt Lake City is appointed local agent and attorney.

The Estella G. M. Co. has been incorporated to develop the Havana Nos. 2, 3 and 4, the Gold King Extension, the Dewey, and bonds on the Gold King, Defender and Havana claims in the North Star district. The incorporators are: S. S. Curry, of Ironwood, Mich.; E. A. Wadhams, of Milwaukee, Wis.; and W. H. Penrose, C. C. Dey and W. H. Bramel of Salt Lake City. Capital is \$500,000 and office Salt Lake City.

BOX ELDER COUNTY.

The Blackbird Copper-Gold M. Co. has been incorporated in West Virginia to work Utah mines, by C. J. North of Buffalo, N. Y., P. A. H. Franklin of Boston, Mass., M. P. Gilbert of Chicago, Ill., W. G. Wells and A. G. Sherman of Buffalo, N. Y., with office in Salt Lake City.

The Little Jimmie M. & M. Co. has been incorporated, capital \$125,000. E. McCarrick is president and A. H. Page secretary and treasurer. The company owns the Horn Silver Nos. 1 to 7, the Horn Silver Spring and the McStein claims in Park valley.

DAVIS COUNTY.

The Kilmarack M. Co. has been incorporated to develop eighteen claims in Farmington district, capital \$500,000. J. F. Baker is president and E. D. Woodruff secretary and treasurer, with office at Salt Lake City.

PIUTE COUNTY.

At the Trapper's Pride mine at Kimberly, owned by the Madsen M. & M. Co., a body of ore has been struck which, reports state, is 6 feet wide and averages \$18 in gold. A. D. McLean is Supt.

PARK COUNTY.

The Horn S. M. Co., at its annual meeting at its office in Salt Lake City, re-elected the present board of directors, with A. C. Washington president, A. J.

Harrison secretary and treasurer and P. T. Farnsworth general manager. Concessions from the railroad and a reduction of \$2 per ton in the tariff on ores between the mine at Frisco and the valley smelter has enabled the mining of ores that were previously rejected, and the result has been a material increase in the tonnage.

SALT LAKE COUNTY.

The Clements M. Co. has been incorporated, capital \$15,000, and office Salt Lake City. W. W. Chisholm is president, J. H. Woodman secretary and treasurer. The company owns the Monitor No. 2, Clements No. 2, Handsome and Extension of Clements No. 2, in Big Cottonwood.

The Alta Con. M. Co. has been incorporated, capital \$30,000, with J. J. Burnswood president and H. Barnett secretary and treasurer. The company owns the Burnswood, Free Coinage, Climax and Bonanza claims in Little Cottonwood.

The final payment of \$25,000 for the Tiewaukee of Bingham has been made by M. S. Effinger and associates of Salt Lake City. Manager Effinger reports 12 feet of high-grade shipping ore opened.

Development work was started by the Sampson M. Co. on the Sampson and Yosemite groups—in all eighteen to twenty claims—at Bingham. Immediate operations are to include sinking 100 feet on main incline of the Sampson, now down 700 feet, and cleaning out and retimbering Yosemite No. 2 tunnel, now in 1100 feet, which is then to be continued 200 feet to connect with Yosemite No. 1 workings. The Sampson M. Co. is understood to be controlled by the Western Ex. Co., in which E. L. Kimberly, W. F. Snyder and W. G. Filer of Salt Lake City are prominent. S. M. Levy is manager, and J. Berryman foreman.

SEVIER COUNTY.

The Blue Eagle M. Co. has been incorporated with T. G. Wimmer as president and E. Williams secretary and treasurer. The capital is \$20,000, and the company owns the Blue Eagle, Blue Eagle No. 1 and Blue Eagle No. 2, in Gifford Springs canyon.

WASHINGTON.

FERRY COUNTY.

At the California mine, at Republic, the main shaft is down over 700 feet. It is claimed high-grade ore is being taken out and that there is not less than \$30,000 worth of ore on the dump and ready for shipment. Supt. Belbridge states that it is possible a diamond drill may be put in place in thirty or forty days.

OKANOGAN COUNTY.

C. M. Fassett, president of the Ivanhoe Express M. Co., has signed a bond of the Ivanhoe claims, in Palmer mountain, at Loomis, at \$100,000, to J. Boyd in the name of the Washington Dev. Co. The mines will be worked from a continuation of the Palmer Mountain tunnel, which is expected to cut the Ivanhoe ledge about where the 2000-foot level would come.

FOREIGN.

BRITISH COLUMBIA.

The Prospectors' Exchange of Nelson says: A contract has been let for the shipment of 60,000 tons of ore from the Snowshoe mine to the Greenwood smelter. The ore will be taken from the surface, where there is a very large body said to run from \$10 to \$30 to the ton in gold and copper. Work on the addition which is being made on the Granby Smelter is being rushed. All the machinery for the enlarged plant is on the ground and is being placed in position. It is thought that the entire plant will be in operation in sixty days. The Bonanza group of claims on St. Thomas mountain, Nelson district, has been bonded to E. W. Thomas of Philadelphia. A two-thirds interest in the Beatrice has been bonded by F. Fulner, the owner of the other one-third. Work will be resumed at once. C. M. McCrassan has bonded the Black Warrior group, near the head of McDonald creek, Lardeau, from T. Horn for \$50,000.

T. Curry & Co. have bonded the Iron Horse mine, Osoyoos district, from J. B. Tierney & Co. of Nelson, at \$58,000. On this property there is a 30-foot ledge which has been traced by open cuts. M. Gilliam has bonded a group of three claims in the Goat River mining division, Nelson district, for \$40,000. It is intended to work the property in a small way all winter. The interests of Silverthorn & Rogers in the Mont Miria group, Similkameen, have been bonded by A. Gallinger of Oshkosh, Wis., on a basis of \$100,000 for the property. The iron mines on Bull river, East Kootenay, have been bonded to S. W. Gebro, representing H. L. Frank of Butte, Mont., at \$120,000, for eleven months. Ten men are engaged in development work. The Northwestern Dev. Syndicate has been organized by A. F. Rosenberger for the purpose of taking over and developing mines. They

have bonded the Camborne and Oyster groups in the Fish River camp, Lardeau district. The capital is \$1,000,000. The registered office is at Nelson.

Nelson, Sept. 24.

For the week ending September 28 the Le Roi mine at Rossland shipped 1680 tons, of which 480 was second-class ore for the Trail smelter and 1200 tons high-grade ore for the Northport smelter. The Josie mine shipped 800 tons to Northport. The aggregate output was 2480 tons, as compared with 1740 tons the previous week.

It is reported that the Granby M. Co. will continue the enlargement of its smelter plant at Grand Forks to bring the capacity up to 2000 tons daily. Two additional furnaces are to be ordered at once, but the construction will not be completed before next spring. A converter is also being installed in connection with the enlargement now in progress.

NEW ZEALAND.

At the New Scotia G. M. Co.'s cyanide plant, Reefton, 2800 tons of tailings were treated during a period of six months from November, 1900, to May, 1901, yielding £1962 12s (£9810), equal to 14s 3d (\$3.31) per ton; less working expenses per ton—supplies, 5d (10 cents) per ton; wages, 2s 1d (50 cents) per ton; cartage and sundries, 1 1/2d (3 1/2 cents) per ton; commission, 6 1/2d (12 1/2 cents) per ton; government royalty, 2 1/2d (5 cents) per ton; cyanide, 3s 5d (82 cents) per ton; zinc, 2 1/2d (4 1/2 cents) per ton; leaving a net profit of 7s 3d (\$1.68 1/2) per ton of sand treated. The total profit was £985 (\$4900). The plant—three 50-ton leaching vats and two sump tanks—is situated close to the battery, thus minimizing working costs. The superintendent reports that the residues after treatment only assayed from 70 cents to \$1.30 of gold per ton. The total cost of the cyanide plant is £1012 17s 5d (\$5000) and its capacity 600 tons per month, allowing for continuous treatment.

Recently Declared Mining Dividends.

| | Payable. |
|--------------------------------------------------------------------------|----------|
| Mary McKinney G. M. Co., Colo., quarterly, 3 cents per share, | Oct. 10 |
| \$30,000 | |
| Uncle Sam M. Co., Utah, No. 2, 3 cents per share, \$15,000 | Oct. 15 |
| Daly - West S. M. Co., Utah, monthly, 40 cents per share, | Oct. 15 |
| \$60,000 | |
| Calumet & Hecla C. M. Co., Mich., quarterly, \$15 per share, \$1,500,000 | Oct. 31 |
| Smuggler M. Co., Colo., monthly, 3 cents per share, \$30,000 | Oct. 15 |
| Portland G. M. Co., Colo., quarterly, 6 cents per share, \$180,000 | Oct. 15 |
| Bald Butte Con. M. Co., Mont., monthly, 6 cents per share, \$15,000 | Oct. 10 |
| Mountain Copper Mines, Ltd., Cal., \$1.20 per share, \$300,000 | Oct. 10 |

Commercial Paragraphs.

THE sun never sets on Cross oil filters. The Burt Mfg. Co. of Akron, Ohio, the manufacturers, report them in use in twenty-eight different countries. A shipment of them was recently made to Stockholm, Sweden.

IN the division of mines and metallurgy at the Buffalo Exposition silver medals have been awarded the Chamber of Commerce, Los Angeles, Cal.; L. B. Eaton & Co., Nevada; Kesseler Bros., San Francisco; F. R. Mellis, Baker City, Or.; Mine & Smelter Supply Co., Denver, Colo.; States of Nevada and Oregon; United States Marble Co., Spokane, Wash.; T. S. Wood, Leadville, Colo.; Woods Investment Co., Victor, Colo.

SOME INTEREST has of late been shown among engineers and others in charge of the large office buildings in St. Louis, Mo., regarding the length of service obtained from the different styles of wire rope in use on their elevators. In the Telephone building two elevators were equipped Jan. 1, 1891, with round-strand rope. The ropes on one of these elevators were replaced in July, 1895, and those of the other in February, 1897—after 4 1/2 and 6 years' service, respectively. A record even more remarkable than the above was made by the elevator ropes in the Mercantile Club, which were in use over seven years on freight and passenger elevators, the latter running late at night. The appearance and condition of the cables after this long service was fully as remarkable as their long life. There was not even a broken wire throughout their entire length, either inside or outside. These ropes had a breaking strain when new of 13,000 pounds. Samples of the worn rope after seven years of continuous service stood a test on a Riehle machine of 11,000 pounds—a loss of less than 20%. Samples of worn round-strand cables

showed a loss of from 25% to 33%—the greatest loss being on 3/4-inch diameter cables with all outside wires broken. Messrs. Broderick & Bascom of St. Louis, Mo., the manufacturers of the round-strand rope, are naturally much gratified with the showing made by their product. They state they have written statements from the owners of the buildings to verify the truth of the above tests.

Personal.

D. EVANS, of Tintic, Utah, is in Tonopah, Nevada.

A. P. MINEAR, of Ketchikan, Alaska, is sojourning at Hailey, Idaho.

C. LINDNER, of Jacksonville, Tuolumne county, Cal., is in New York.

P. C. STOEES of Wallace, Idaho, is examining mines in southeastern Alaska.

W. DUFFY, Supt. of the Sailor Canyon mine, Westville, Cal., is in San Francisco.

J. ROSS, Supt. Wildman-Mahoney mine at Sutter Creek, Cal., is in San Francisco.

F. JOHNSON has been appointed Supt. of the Deerhorn mine at Cripple Creek, Colo.

JOS. SNOW, of Newtown, El Dorado county, Cal., has returned from Nome, Alaska.

JESSE J. MACDONALD of Los Angeles, Cal., is in Denver, in connection with cyanide matters.

S. I. SILVERMAN, of Spokane, Wash., is at Coppermount, Prince of Wales island, Alaska.

O. P. POSEY of Salt Lake City, Utah, has returned there from a mine examining trip in Arizona.

ARTHUR HAUMAN, recently metallurgist Los Animas mine, Llano, Mexico, has returned to San Francisco.

CHAS. BUTTERS, who recently returned to Berkeley, Cal., from Europe, leaves this week for Salvador, C. A.

A. W. MCCUNE of Salt Lake City, Utah, has returned there from an examination of copper mines in Peru.

R. JONES, superintendent of the Canada Hill G. M. Co., of Placer county, Cal., is sojourning in San Francisco.

W. L. WATTS, returned from Humboldt county, Cal., pursues his oil reconnaissance at Santa Barbara, Cal.

B. F. JAMES, recently returned from South America, goes to take charge of a mining plant at Placerville, Cal.

E. C. ENGLEHARDT has returned to Denver, Colo., from a professional trip through Arizona and California.

E. RAMMELMEYER, of Nelson, B. C., has been appointed superintendent of the New Fairview M. Co., at Fairview, B. C.

F. HAMILTON of Cripple Creek, Colo., has been appointed manager of a large mining property near the City of Mexico.

P. PETIT, M. E., of Paris, France, who has been developing some mining property in Colombia, S. A., is in San Francisco.

J. CHIPMAN, of Tintic, Utah, has been elected superintendent of the Uncle Sam mine at that place, succeeding D. Evans, resigned.

R. J. FRECHEVILLE of London, Eng., director of the Le Roi M. Co., is at Rossland, B. C., examining affairs at the Le Roi mine.

A. L. WATSON has been appointed general foreman Newport Smelter, at Northport, Wash., succeeding Supt. D. C. Connolly, resigned.

H. SPENCE of Salt Lake City, Utah, is at the Balakalala copper mines, near Redding, Cal., in charge of diamond drill explorations in it.

W. F. MITCHELL, who has lately been examining copper mines in Shasta county, Cal., has returned to his home in Salt Lake City, Utah.

D. MACLAREN, consulting engineer of the Norman Proprietary G. Mines, Ltd., and Melvin Mines Syndicate, Ltd., of Australia, is in Cripple Creek, Colo., examining the mines of that district.

A. H. BROOKS and C. C. BRAYTON of the U. S. Geologic Survey have returned from Prince of Wales Island, where they have put in the summer making a survey of that territory, and have gone to Washington, D. C., to report.

H. L. DURDEN, for nineteen years curator of the museum of the California State Mining Bureau, is succeeded by Mr. Hyde. Mr. Durden has an honorable record for efficiency, and during the long period of his incumbency ably discharged the duties of that responsible position.

DR. DAVID T. DAY, who has charge of the department of mining and metallurgy at the St. Louis Exposition, has returned from San Francisco to New York City. While in San Francisco he appointed as his Pacific coast assistant Charles G. Yale of the San Francisco U. S. Mint.

Latest Market Reports.

SAN FRANCISCO, Oct. 10, 1901.

SILVER.—Per oz., Troy; London, 26 1/4 d (standard ounce, 925 fine); New York, bar silver, 57 1/2 c (1000 fine); San Francisco, 57 1/2 c Mexican dollars, 47 1/2 c San Francisco, 45 1/2 c New York.

COPPER.—New York: Lake, 1 to 3 casks, \$17.25; carload lots, \$17.00; Electrolytic, 1 to 3 casks, \$16.75; carload lots, \$16.62 1/2; Casting, 1 to 3 casks, \$16.60; carload lots, \$16.50. San Francisco: 18. Mill copper plates, 20c; bars, 22 1/2 c. London: £63 15s per ton.

LEAD.—New York, \$4.37 1/2; Salt Lake City, \$4.00; St. Louis, \$4.40; San Francisco \$4.90, carload lots; 5 1/2 c 1000 to 4000 lbs.; pipe 6, sheet 6 1/2, bar 5 1/2 c; pig, \$5.25. London, £11 5s 0d per ton=2.44 cents per lb.

SPELTER.—New York, \$4.20; St. Louis, \$3.75; London, £16 2s 6d per ton=3.58 1/2 cts. per lb.; San Francisco, ton lots, 5 1/2 c; 100-lb lots, 6c.

ANTIMONY.—New York, Cookson's, 10c; Hallett's, 9c; San Francisco, 1000-lb. lots, 10c; 300 to 500 lbs., 11c; 100-lb. lots, 13 1/2 c.

IRON.—Pittsburg, Bessemer pig, \$16.00; gray forge, \$14.00; San Francisco, bar, per lb., 2.65c in small quantities.

STEEL.—Bessemer billets, Pittsburg, \$24; open hearth billets, \$26.50; San Francisco, bar, 7c to 12c per lb.

TIN.—New York, \$27.50; San Francisco, ton lots, 30c; 1000 lbs., 30 1/2 c; 500 lbs., 30 1/2 c; less, 31c; bar tin, \$3.35.

QUICKSILVER.—New York, \$51.00 large lots; London, £9 2s 6d; San Francisco, local, \$47.50 per flask of 76 1/2 lbs.; Export, \$45.00.

MAGNESIUM.—New York, \$2.90 per lb.; San Francisco, \$3.75.

ZINC.—San Francisco, 5 1/2 c; slab, 5 1/2 c; bar, 7c; zinc dust, N. Y., 8c.

BABBITT METAL.—San Francisco, No. 1, 10c.

NICKEL.—New York, 50@60c per lb.

ALUMINUM.—New York, No. 1, 99% pure ingots, 35c; No. 2, 90%, 30c to 35c.

SOLDER.—Half-and-half, 100-lb. lots, 19c; San Francisco, Plumbers', 100-lb. lots, 15 1/2 c.

PHOSPHORUS.—F. o. b. New York 50@60c per lb.

ASSAY LITHARGE.—San Francisco, 10c per lb., small lots.

PLATINUM.—San Francisco, crude, \$19 1/2 oz.; New York, \$20.50 per Troy oz.

BISMUTH.—New York, \$3.10, \$2.25 50-lb lots; San Francisco, \$2.50 to \$2.75 per lb.

FERRO-MANGANESE.—Pittsburg, 80%, domestic, \$58.50, large lots.

TUNGSTEN.—New York, \$1.95c; San Francisco, \$1.15.

FERRO-TUNGSTEN.—New York, 37%, 32c; San Francisco, 65c (60%).

POWDER.—F. o. b. San Francisco: No. 1, 70% nitro-glycerine, per lb., in carload lots, 15 1/2 c; less than one ton, 17 1/2 c. No. 1*, 60% carload lots, 13 1/2 c; less than one ton, 15 1/2 c. No. 1** 50%, carload lots, 11 1/2 c; less than one ton, 13 1/2 c. No. 2, 40%, carload lots, 10c; less than one ton, 12c. No. 2* 35%, carload lots, 9 1/2 c; less than one ton, 11 1/2 c. No. 2** 30% carload lots, 9c; less than one ton, 11c. Black blasting powder in carload lots, minimum car 725 kegs, \$1.50 per keg; less car lots, \$2 per keg.

CAPS.—3x, \$5.50 per 1000; 4x, \$6.50; 5x, \$8; Lion, \$9, in lots not less than 1000.

FUSE.—Triple tape, \$3.60 per 1000 feet; double tape, \$3.00; single tape, \$2.65; Hemp, \$2.10; Cement No. 2, \$3.00; Cement No. 1, \$2.65, in lots of 3000 feet and up.

CANDLES.—Granite 6s; 16 oz., 40s., 9 1/2 c set; 14 oz., 40s., 8 1/2 c.

OILS.—Linsed, pure, boiled, bbl., 74c; cs., 79c; raw, bbl., 74c; cs., 78c. Deodorized Stove Gasoline, bulk, 14 1/2 c; do., cs., 20 1/2 c; 86° Gasoline, bulk, 20c; do., cs., 26c; 63° Naphtha or Benzine, deodorized, in bulk, per gal., 13 1/2 c; do., in cs., 19 1/2 c; Lard Oil, Extra Winter Strained, bbl., 75c; cs., 80c; No. 1 bbl., 50c; cs., 55c. Neatsfoot Oil, cooper's' bbls., 60c; cs., 65c; No. 1 bbl., 50@52 1/2 c; cs., 55@57 1/2 c.

CHEMICALS.—Cyanide of potassium, 98%—99%, jobbing, 31 1/2 @ 32 1/2 c per lb.; carloads, 29@30c; in 10-lb. tins, 40c; sulphuric acid, in carboys, 66% B, 2c per lb.; soda ash, \$1.90 per 100 lbs.; hyposulphite of soda, 2 1/2 @ 3c per lb.; blue vitriol, 5 1/2 @ 6 1/2 c per lb.; borax, concentrated, 7@8c per lb.; chlorate of potash, 12@13c; roll sulphur, 6c; alum, \$1.90@2.00; flour sulphur, French, 2 1/2 @ 2 1/2 c; California refined, 1 1/2 @ 2c; nitric acid, in carboys, 8c per lb.; caustic soda, in drums, 3@4c per lb.; Cal. s. soda, bbls., \$1.00; sks, 95c per 100 lbs.; chloride of lime, spot, \$2.50@2.60; nitrate of potash, in kegs, 8c; caustic potash, 10c in 40-lb. tins.

COAL.—San Francisco, coast, yard prices: Wellington, \$9; Seattle, \$7.00; Coos Bay, \$5.50; Southfield, \$9.00. Cargo lots, Eastern and foreign: Wallsend, \$8.00; Brymbo, \$7.50; Pennsylvania, hd., \$14.00; Scotch, \$8; Cumberland, \$12; Cannel, \$9.50; Welsh Anthracite, \$12.00; Rock Springs, \$8.50; Colorado Anthracite, \$14.50. Coke, \$16 per ton in bulk; \$18 in sacks.

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New Patents.

DEWEY, STRONG & CO.'S SCIENTIFIC PRESS PATENT AGENCY, 330 Market St., S. F., has official reports of the following U. S. patents issued to Pacific coast inventors:

FOR THE WEEK ENDING OCT. 1, 1901.

- 683,547.—CONCENTRATING BELT—W. F. Bowers, S. F.
 683,590.—SAW MILL—G. W. Brower, Portland, Or.
 683,644.—ORE SAMPLER—A. C. Calkins, Los Angeles, Cal.
 683,789.—CANN TESTING MACHINE—W. S. Case, Hayward, Cal.
 683,833.—PROOF ALBUM—S. Forbes, Berkeley, Cal.
 683,747.—FOOT WARMER—F. H. Gotsche, S. F.
 683,764.—NUT LOCK—H. R. Hopgood, Montone, Cal.
 683,779.—VELOCIPED—J. Lund, S. F.
 683,613.—GOLD SAVING APPARATUS—A. Marcotte, Gaston, Cal.
 683,655.—SECURING CAMS ON SHAFTS—E. H. Moyle, S. F.
 683,884.—WATER SEAL TRAP—T. F. Payne, Spokane, Wash.
 683,683.—ROCK DRILL—W. W. Waite, Colfax, Wash.
 683,827.—WINDOW VENTILATOR—D. E. Werts, Grants Pass, Or.

Notices of Recent Patents.

Among the patents recently obtained through Dewey, Strong & Co.'s SCIENTIFIC PRESS U. S. and Foreign Patent Agency, the following are worthy of special mention:

DEVICES FOR SECURING CARS OR LIKE HUBS UPON THEIR SHAFTS.—E. H. Moyle, San Francisco, Cal. No. 683,655. Oct. 1, 1901. The object of this invention is to provide a means for removably securing cars, pulleys and the like upon shafts. The shaft has an eccentric portion, and the hub has a bore and key-way therein extending longitudinally through one end of the hub. It also has an annular groove or channel and a segmental key in the key-way extending across this groove or channel and abutting against the side thereof. When the parts are turned in the desired direction, either the shaft driving the pulley or cam, or vice versa, the eccentric portion of the shaft acting in conjunction with the tapered segmental key, serves to bind the latter tightly between the shaft and the cam or pulley, and they are thus firmly locked as long as the parts are driven in that direction. To loosen the parts, force is applied to turn in the opposite direction until the key has been loosened in its seat.

CAN TESTING MACHINES.—W. S. Case, Hayward, Cal. No. 683,789. Oct. 1, 1901. This invention is designed to test the seams of cans after they have left the soldering machine to determine if they are air-tight. It comprises an endless conveyor with clamping devices between which the cans to be tested are received. An air reservoir, revolvable in unison with the pulleys carrying the conveyor, connections between this reservoir and the clamps, so that air under pressure may be ad-

mitted to the cans. The cans are submerged during the travel of the conveyor in a fluid-containing trough, and means are employed for holding the imperfect cans and delivering them separately from the perfect ones.

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An experienced mill man desires position in mill; understands Amalgamation, Concentration and Assaying. Address G. M., this office.

A first-class machinist, engineer and cyanide man wants situation. Ten years experience in cyanide plants; three years foreman; three years superintendent. Address reference. Box 93, this office.

WANTED.—Position as superintendent or general manager of a copper smelter or Bessemer plant. Eighteen years' experience. Speak Spanish. Thorough knowledge of carbonate or sulphide ores. References exchanged. Address Box 601, care Mining and Scientific Press.

WANTED.—Position by a practical mine foreman in America or Mexico. Have twenty-one years' experience in gold, silver, copper, lead and zinc mines. Speak Spanish. Have best of recommendations. Modest salary required. Address J. R. H., care Mining and Scientific Press.

WANTED.—SITUATION BY A PRACTICAL mill man, assayer and cyanide man; is also a practical miner. Understands mine bookkeeping. No objection to Mexico. Best of references. Address W., care Mining and Scientific Press office.

A Civil and Mining Engineer (member American Society of Civil Engineers, member American Institute of Mining Engineers), at present general manager of a Western gold mining company, desires change. Will go anywhere. Examining or reporting, exploration work or operating. Address Box 264, Grangeville, Idaho.

MINING ENGINEER, graduate Mass. Inst. Tech., with thirteen years' experience as miner and surveyor for large copper company in Montana; superintendent of coal mine, washer and coke oven plant and railroad in South for six years; in charge of zinc property in Missouri; familiar with concentrating methods; at present in charge of cyanide operations of tailings pile in California, desires position with reliable company. Open for engagement after October 15. Address S. J. M., care Mining and Scientific Press.

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one of the PLATINUM METALS and invariably associated with it and usually with gold in placer and beach mines, has now considerable market value. It is tin-white, heavier than gold and occurs in small scales. For information about saving IRIDOSMIUM and PLATINUM, write to the Waratah Minerals Company, Limited, 140 Ellis St., San Francisco, Cal. For sale, send them to Welsbach Company, Broad and Arch Sts., Philadelphia, Pa. Analysis free.

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THE CALIFORNIA DEBRIS COMMISSION, having received applications to mine by the hydraulic process from G. F. Edwards, in the Philo Haven Consolidated Placer Mine, near Gold Lake, Sierra Co., to deposit tailings in Mud Lake, which drains into Frazier Creek; from the Purdy Creek Mining Co., in the Purdy Creek Mine, near Frenchtown, Yuba Co., to deposit tailings in Purdy Creek; from Edward Bryan, in the Chaparral Hill Gold Gravel Mine, near Onion Valley, Plumas Co., to deposit tailings in Borg Creek; and from the Norwegian Mining Co., in their mine near Tuttle-town, Tuolumne Co., to deposit tailings in Rock Creek, in the South Honcut Mine, in Yuba Co., near Bangor, to deposit tailings in South Honcut Creek, gives notice that a meeting will be held at Room 59, Flood Building, San Francisco, Cal., on October 21, 1901, at 1:30 P. M.

THE CALIFORNIA DEBRIS COMMISSION, having received applications to mine by the hydraulic process from the Calaveras Mining, Water & Power Co., in the Johnston and Scott Hill Mines, near San Andreas, Calaveras Co., to deposit tailings in Willow Creek; from Chas. Hilton, in the Calaveras Hill Mine, at Calaveritas, Calaveras Co., to deposit tailings in gulches draining into O'Neill and San Antonio Creeks; and from Manuel Lualaba and Co., in the South Honcut Mine, in Yuba Co., near Bangor, to deposit tailings in South Honcut Creek, gives notice that a meeting will be held in Room 59, Flood Building, San Francisco, Cal., on Oct. 28, 1901, at 1:30 P. M.

NOTICE.

Notice is hereby given to all parties not to use, manufacture, permit to be used or manufactured, any device employing the process of the ROBINSON ORE CONCENTRATOR or any infringement thereon, except by legal authority.

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- Compound High Speed.**
- 1-371 " 15x25x15 Armstrong Sims
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- High Speed Automatic.**
- 1-151 " 16x15 Phoenix
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 - 1-101 " 13x12 Ideal
 - 1-101 " 18x12 Phoenix
 - 1-101 " 10x15 Weston
 - 1-80 " 12x16 Weston
 - 1-75 " 12x18 Taylor
 - 1-55 " 11x10 Ideal
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DELINQUENT SALE NOTICE.

WILLIETTA MINING AND MILLING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Tuolumne County, California.
NOTICE.—There are delinquent upon the following described stock, on account of assessment (No. 2) levied on the 19th day of August, 1901, the several amounts set opposite the names of the respective shareholders, as follows:

| Names. | No. Cert. | No. Shares. | Amt. |
|--------------------------|-----------|-------------|-------|
| H. T. Ladd..... | 32 | 1250 | 12 50 |
| William Nolden..... | 2 | 10 | 10 |
| William Nolden..... | 104 | 1000 | 10 00 |
| William Nolden..... | 107 | 1000 | 10 00 |
| William Nolden..... | 108 | 1000 | 10 00 |
| Frank E. Cordes..... | 144 | 1000 | 10 00 |
| Frank E. Cordes..... | 145 | 3000 | 30 00 |
| Frank E. Cordes..... | 146 | 750 | 7 50 |
| Frank E. Cordes..... | 147 | 750 | 7 50 |
| Fred M. Bowman..... | 9 | 500 | 5 00 |
| Carl Vogel..... | 19 | 100 | 1 00 |
| Charles Zissig..... | 20 | 101 | 1 00 |
| Charles Zissig..... | 65 | 250 | 2 50 |
| Charles Zissig..... | 71 | 250 | 2 50 |
| Harry H. Becker..... | 11 | 250 | 2 50 |
| G. W. Smith..... | 11 | 100 | 1 00 |
| Frank Quinn..... | 58 | 1000 | 10 00 |
| W. T. Rancel..... | 59 | 250 | 2 50 |
| Robert Vincent..... | 60 | 1000 | 10 00 |
| Frank Fischer..... | 81 | 200 | 20 00 |
| William F. H. Osmun..... | 87 | 50 | 5 00 |
| John P. H. Osmun..... | 88 | 500 | 5 00 |
| John P. Albro..... | 99 | 2500 | 25 00 |
| J. P. E. Heintz..... | 166 | 250 | 2 50 |
| George E. Stayton..... | 117 | 2000 | 20 00 |
| George E. Stayton..... | 118 | 2000 | 20 00 |
| George E. Stayton..... | 124 | 500 | 5 00 |
| M. Reubold..... | 6 | 100 | 10 |
| Alfred I. Levy..... | 14 | 1000 | 10 00 |

And in accordance with law, and an order from the Board of Directors, made on the 14th day of August, 1901, so many shares of each parcel of such stock as may be necessary, will be sold at public auction at the office of said company, Room 8, 206 Sansome street, San Francisco, California, on MONDAY, the 21st day of October, 1901, at the hour of 1:30 o'clock P. M. of said day, to pay said delinquent assessment thereon, together with costs of advertising and expenses of sale.

E. McALLISTER, Acting Secretary.
Office—Room 8, No. 206 Sansome street, San Francisco, California.

DELINQUENT SALE NOTICE

ETNA PETROLEUM COMPANY.—Principal place of business San Francisco, California.
NOTICE.—There is delinquent upon the following described stock, on account of assessment levied on the 22d day of August, 1901, the several amounts set opposite the names of the respective shareholders, as follows:

| Name. | No. Cert. | No. Shares. | Amt. |
|-----------------------|-----------|-------------|----------|
| J. A. Chancellor..... | 7 | 25 | \$250 00 |

And in accordance with law, and an order of the Board of Directors, made on the 22nd day of August, 1901, so many shares of each parcel of such stock as may be necessary, will be sold at the office of the company, No. 316 California street, San Francisco, California, on the 14th day of October, 1901, at 2 o'clock P. M. of such day, to pay delinquent assessments thereon, together with costs of advertising and expenses of the sale.

R. F. MACLEOD, Secretary.
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ASSESSMENT NOTICES.

THE CALIFORNIA DREDGING COMPANY.—Principal place of business, 120 Sutter Street, San Francisco, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 13th day of September, 1901, an assessment (No. 2) of \$10 per share was levied upon the capital stock of the corporation, payable immediately in gold coin, to the secretary of the corporation, at the office of the company, Room 56, 120 Sutter Street, San Francisco, California. Any stock upon which this assessment shall remain unpaid on MONDAY, the 21st day of October, 1901, will be delinquent and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 11th day of November, 1901, to pay the delinquent assessment, together with the cost of advertising and expenses of sale.

SAM. W. CHEYNEY, Secretary.
120 Sutter Street, San Francisco, California.

MARIPOSA COMMERCIAL AND MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Mariposa County, California.

Notice is hereby given, that, at a meeting of the Board of Directors, held on the 11th day of September, 1901, an assessment (No. 24) of Ten Dollars per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, Room 223 Crocker Building, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 21st day of October, 1901, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 11th day of November, 1901, to pay the delinquent assessment, together with the costs of advertising and expenses of sale. By order of the Board of Directors.

ALEX. GRANGER, Secretary.
Office—Room 223 Crocker Building, San Francisco, California.

MARINA MARSHOAN GOLD MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Sunny Hill, Shasta County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 7th day of September, 1901, an assessment (No. 25) of one (1) cent per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 217 Sacramento street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 14th day of October, 1901, will be delinquent and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 4th day of November, 1901, to pay the delinquent assessment, together with the costs of advertising and expenses of sale. By order of the Board of Directors.

CHAS. BOVONE, Secretary.
Office—217 Sacramento street, San Francisco, California.

TANANA MINING COMPANY.—LOCATION OF principal place of business, San Francisco, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 30th day of September, 1901, an assessment (No. 4) of ten cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, Room 801 of the Claus Spreckels Building, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 14th day of October, 1901, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 2nd day of December, 1901, to pay the delinquent assessment, together with the costs of advertising and expenses of sale. By order of the Board of Directors.

EDWARD H. STERN, Secretary.
Office—Room 801 Claus Spreckels Building, San Francisco, California.

THE THORPE MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Fourth Crossing, Calaveras County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 9th day of October, 1901, an assessment (No. 11) of one (1) cent per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 632 Sacramento street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 16th day of November, 1901, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 9th day of December, 1901, to pay the delinquent assessment, together with the costs of advertising and expenses of sale. By order of the Board of Directors.

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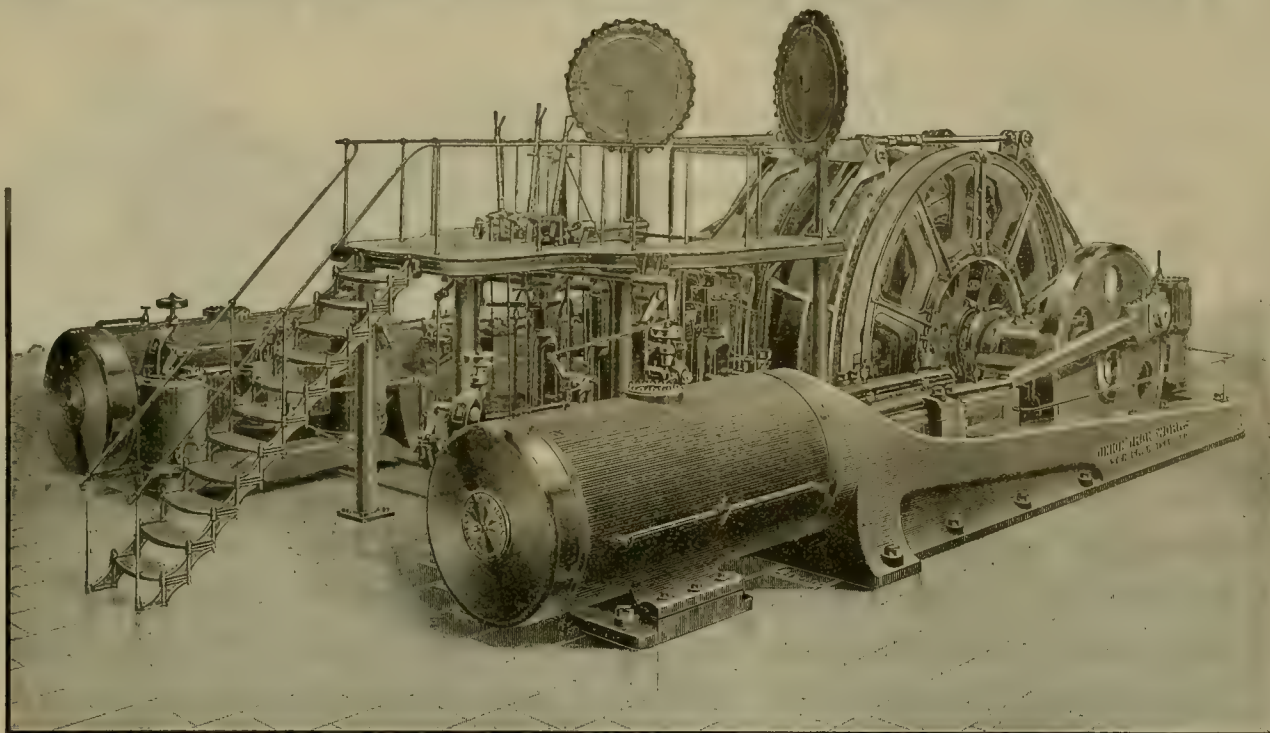
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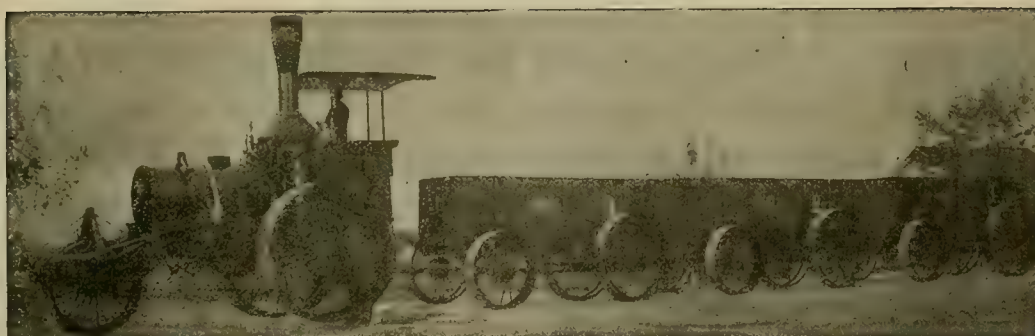
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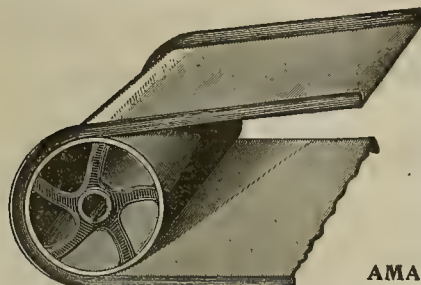
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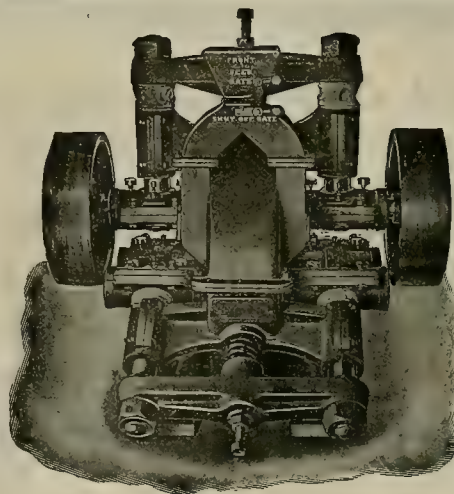
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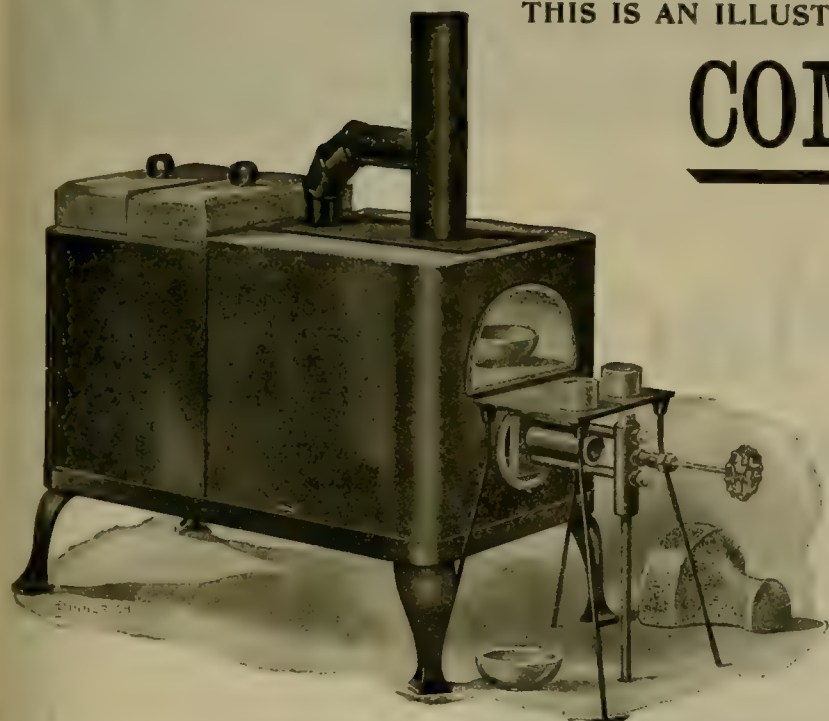
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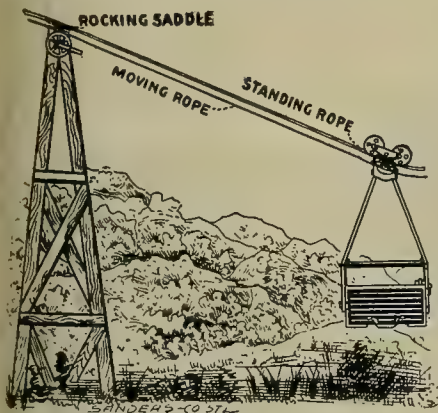
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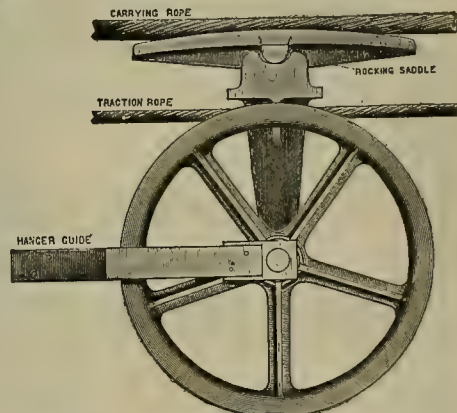
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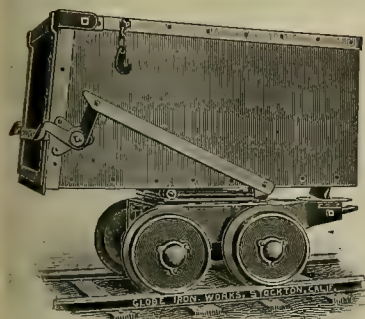
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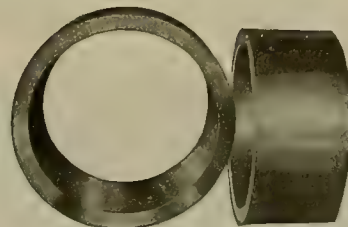
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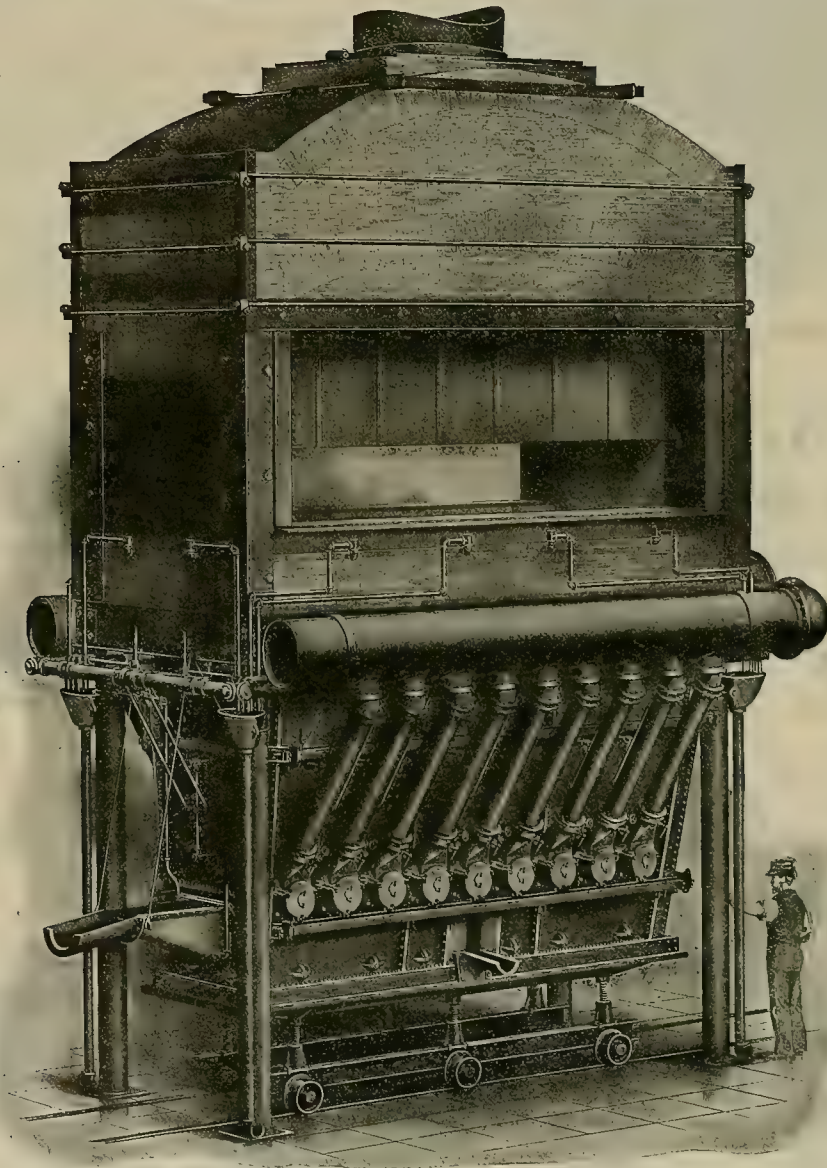
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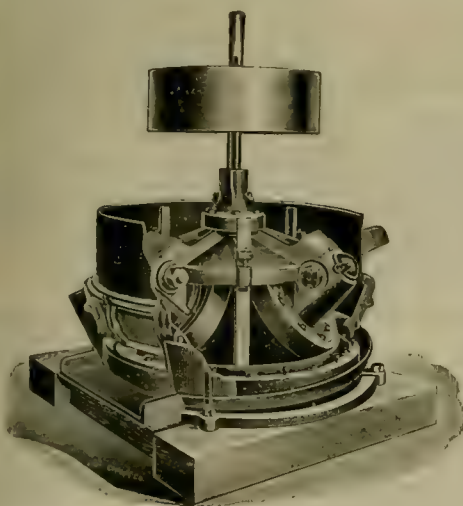
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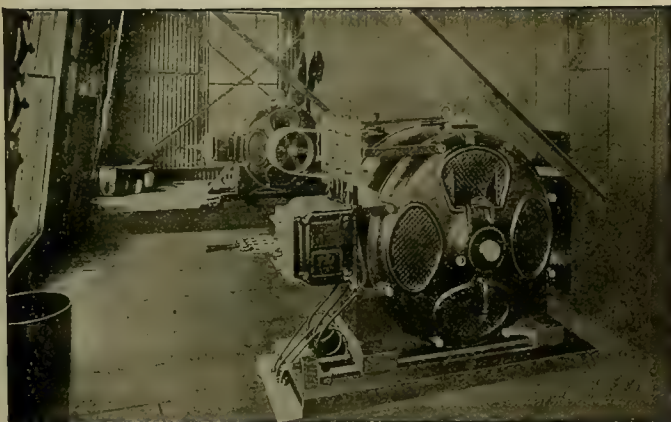
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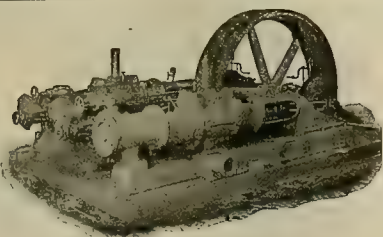
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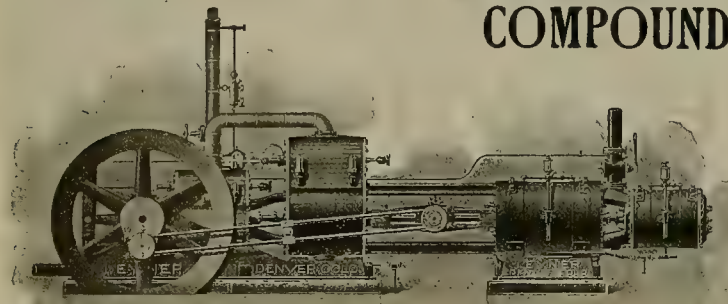
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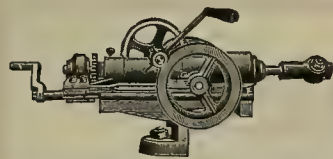
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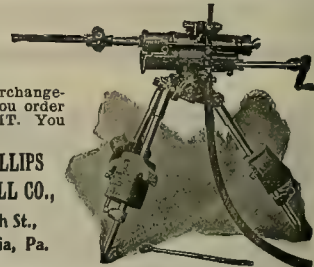
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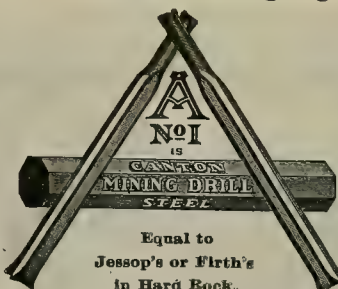
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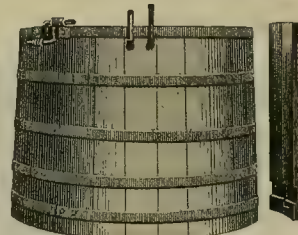
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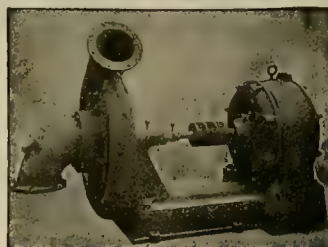
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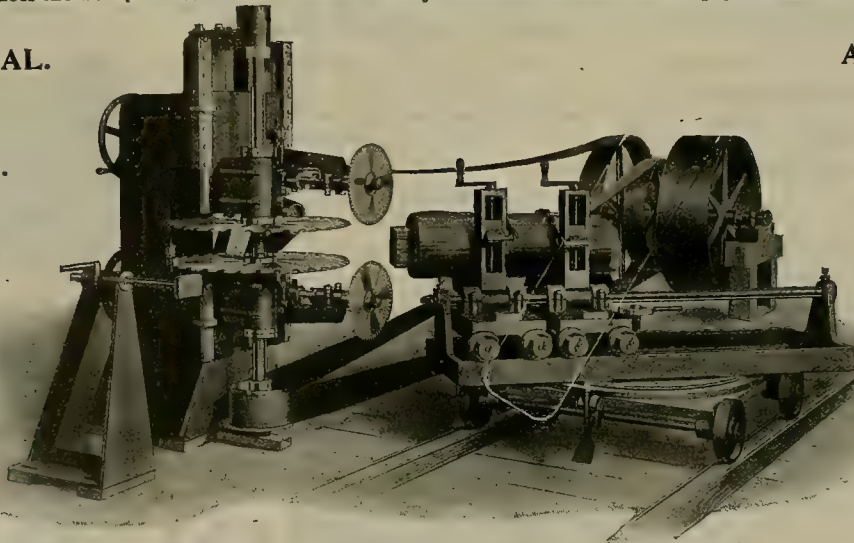
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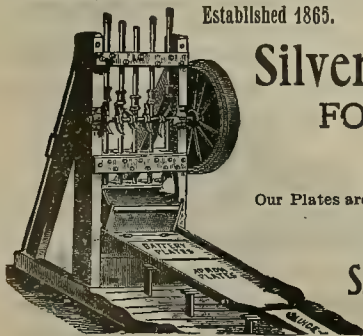
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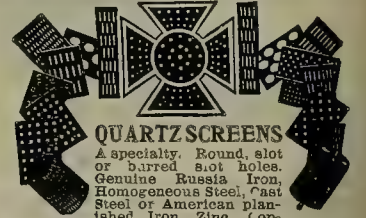


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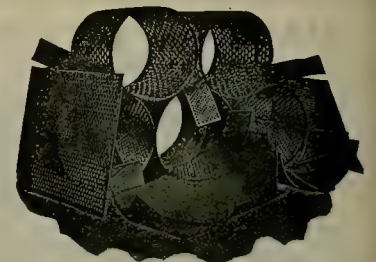
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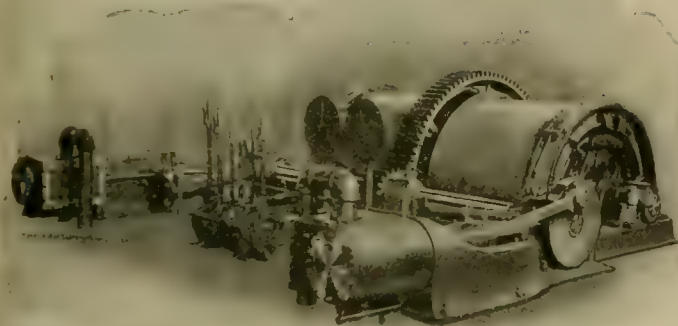
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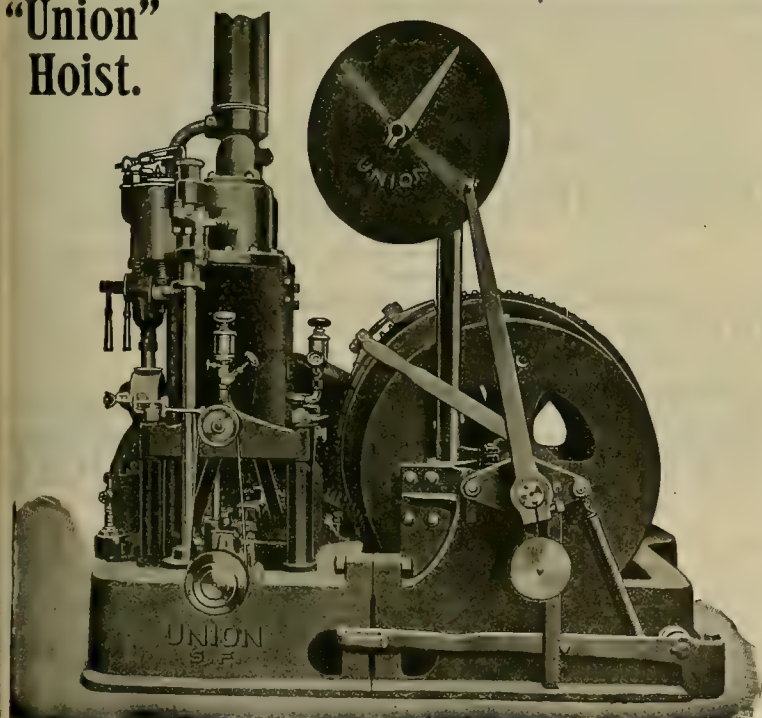
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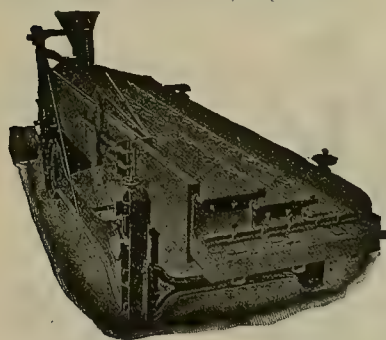
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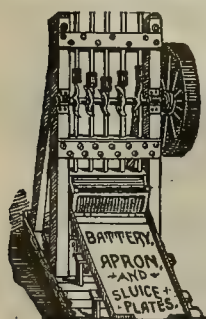
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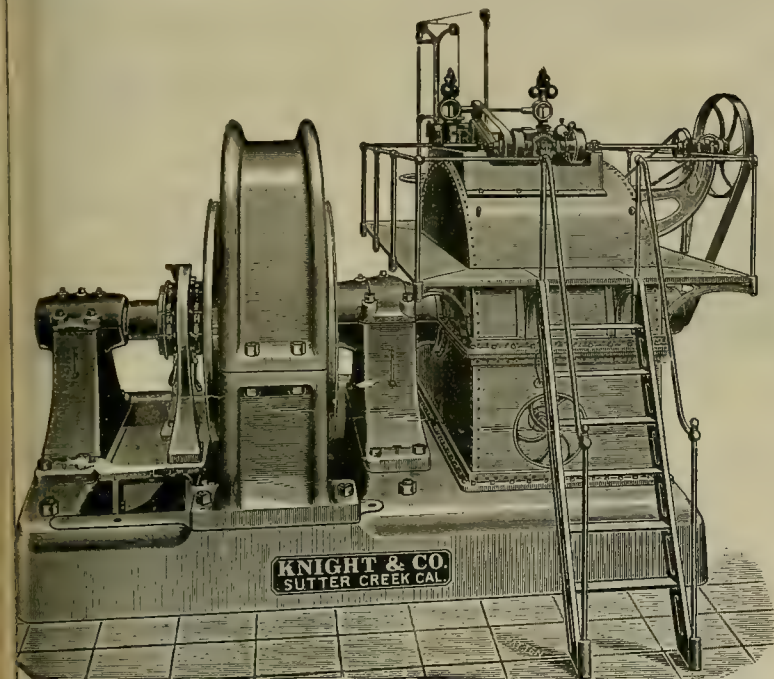
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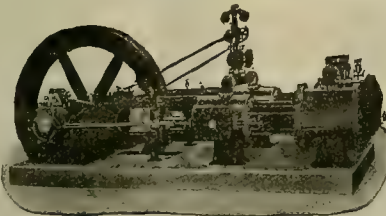


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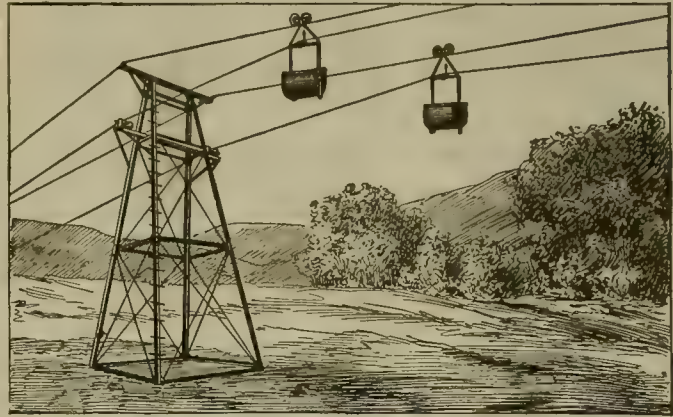
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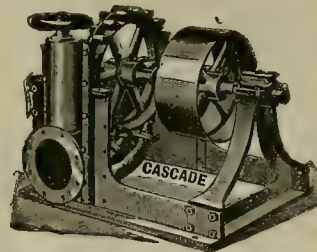
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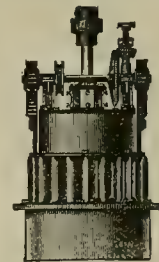
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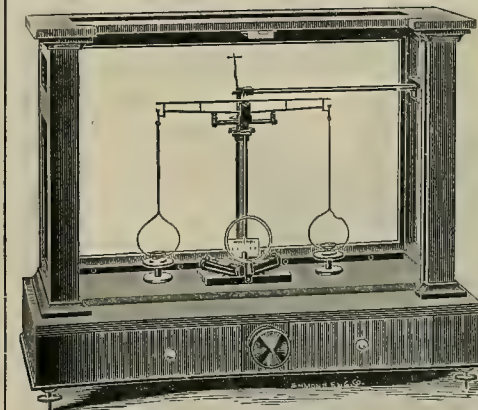


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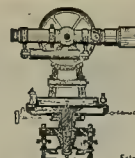


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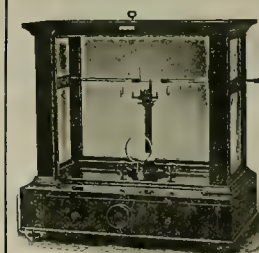
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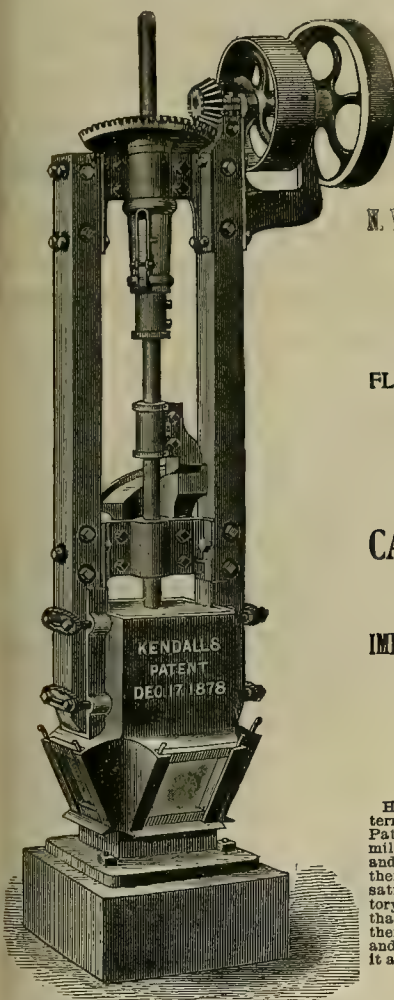
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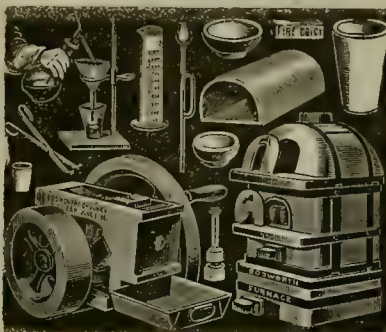
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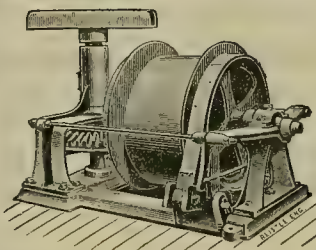
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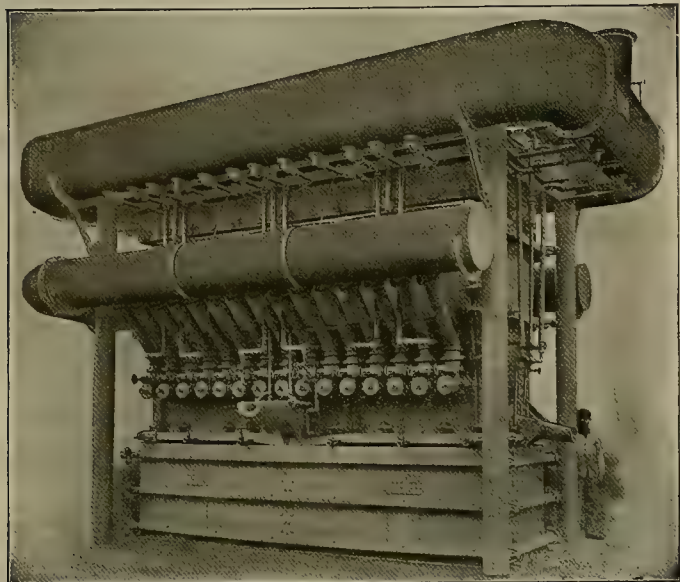
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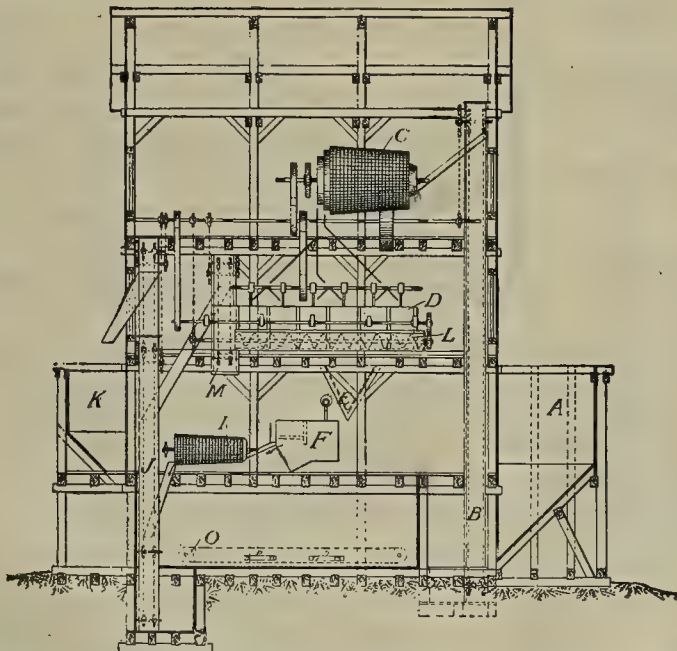
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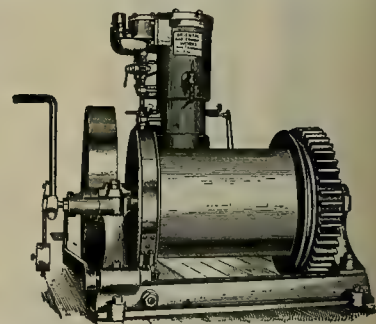
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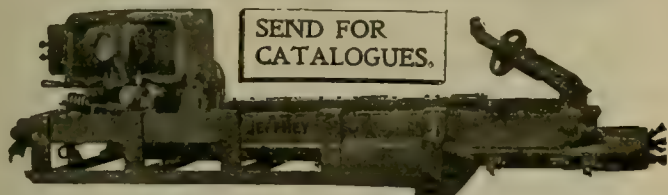
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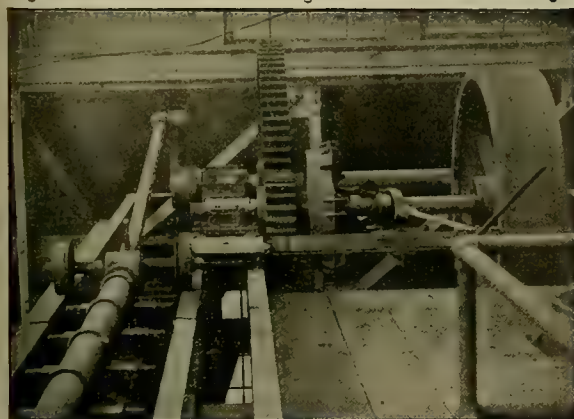


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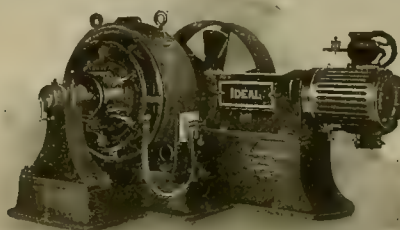
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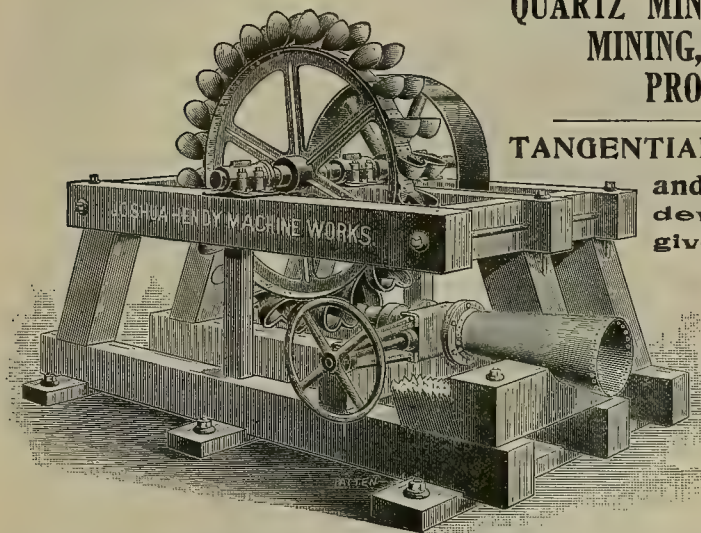
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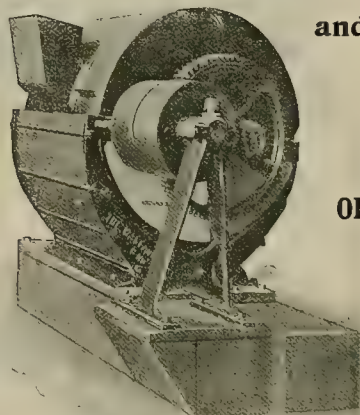
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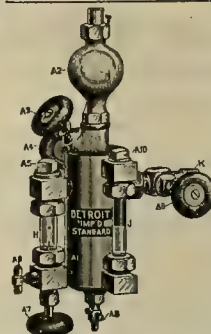
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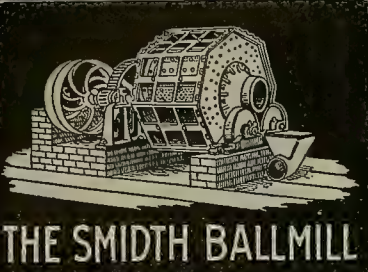
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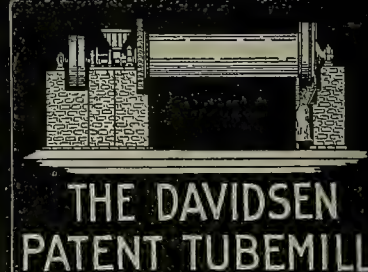
THE SMIDTH BALLMILL

AN EXPERT OPINION.

L. S. Russell of Lansing, Mich., of the Bureau of Labor and Industrial Statistics of Michigan, has recently completed a tour of investigation of the Portland cement industry of his State. He is particularly enthusiastic over the Omega Portland Cement Company's plant at Jonesville, Michigan, which he terms "the really model factory, where everything is run on a perfect system."

"Cement," Sept. 1901.

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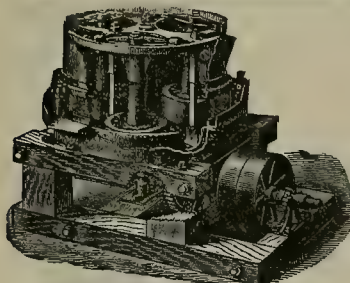
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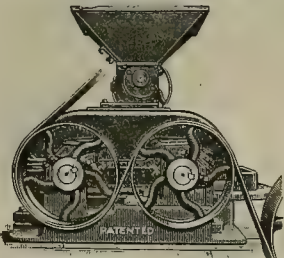
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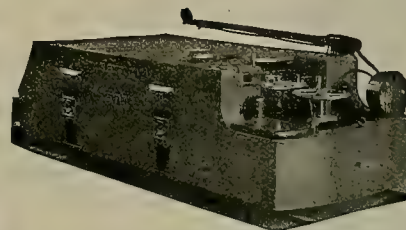
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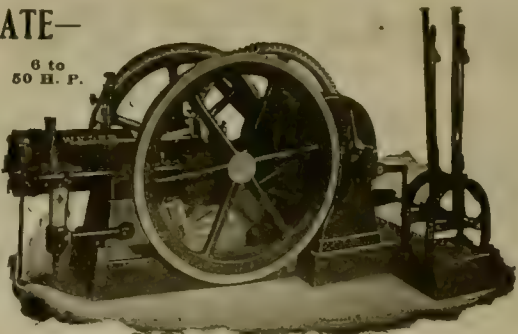
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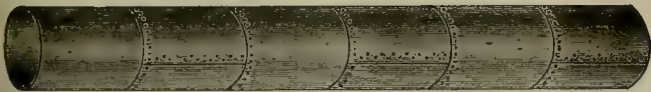
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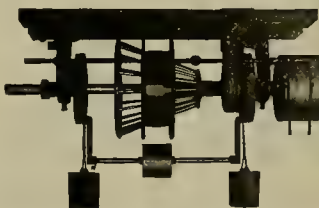
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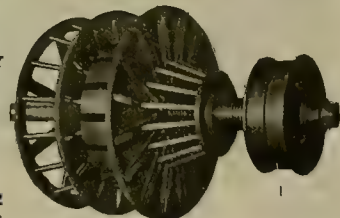


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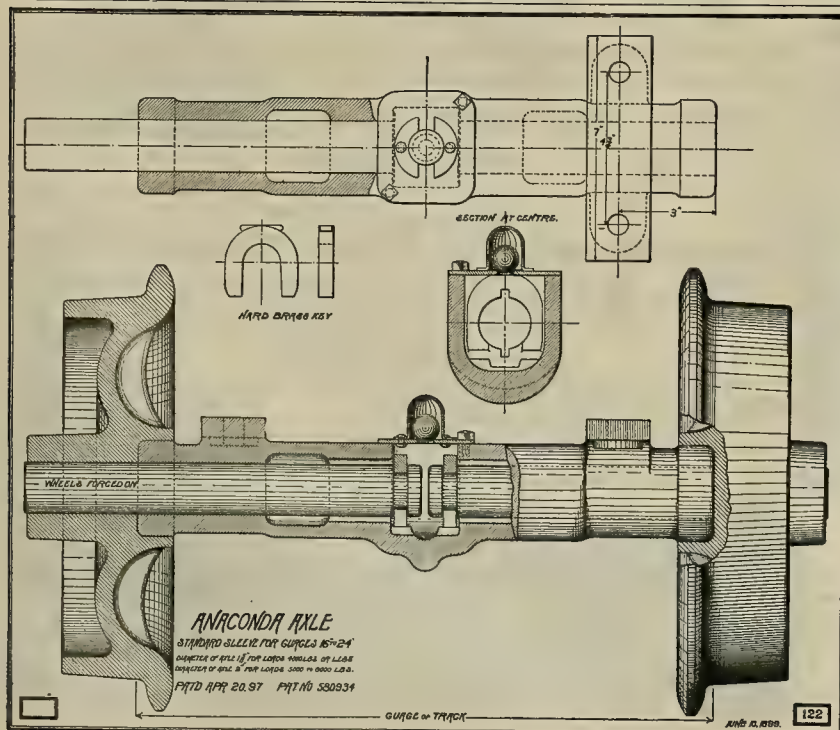
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Whole No. 2152.—VOLUME LXXXIII.
Number 16.

SAN FRANCISCO, SATURDAY, OCTOBER 19, 1901.

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Iron and Steel Manufacture on the Pacific Coast.

The possibilities for profit from iron and steel manufacture on the Pacific coast seem now to be sufficiently close to realization to make their discussion timely and pertinent. The old conditions, which made the early attempts in the industry failures, have given place to new conditions which would tend to make the business successful. Consumers of iron and steel will buy where they can buy cheapest. The problem on the Pacific coast for local iron and steel manufacture is solely the supply to consumers on the Pacific coast and points reached by water routes from it of these metals cheaper than their manufacture elsewhere can supply the consumers. This, then, involves a comparison of costs.

Iron and steel are manufactured in Pittsburg at a flat operative cost, which does not include any profits or earnings on capital, of \$7.50 and \$12.50 a ton, respectively. These are the lowest figures, and \$8.50 and \$14 would be closer ordinary practice. Taking the lowest figures above, and adding freight by rail to the Pacific coast, which amounts to \$13.40 a ton, the present flat costs at point of delivery to the consumer are \$20.90 and \$25.90 a ton, respectively. Sea freights via Cape Horn added to rail freights from Pittsburg to the Atlantic could not lessen these figures much. It is possible that rail freights could be reduced to \$10 a ton, making the respective costs per ton for iron and steel \$17.50 and \$22.50 at the point of delivery to consumers. These last it would seem can be considered the figures of flat costs which Pacific coast manufacture can rise to and still be on even terms with Pittsburg manufacture.

For the Trans-pacific markets in China, Japan, Siberia and the Philippines, the present sea freight

charges for transportation from Pittsburg via New York and Suez canal average \$12.50 a ton. Reducing the charges, which pay profits, to the flat costs, which the ownership of the steamship lines by the iron and steel manufacturing businesses would bring, the transportation per ton from Pittsburg would cost by rail to New York \$2.40, by water not less than \$6.50—a total of \$8.90. This last figure added to the Pittsburg costs makes the cost at the points of consumption in the Orient \$16.40 and \$21.40 a ton, respectively. Present freight charges from the Pacific coast to the countries across the Pacific average about \$10 a ton. These charges reduced to flat costs can be reduced to \$3, provided a return freight business is developed. A return freight business already exists by the Suez route. Here it has to be made. This return freight business can be made by the transportation of coke for use in the manufacture of the iron and steel. Coke can be made in China and Siberia, possibly in Korea as well, to cost on board ship \$1.50 a ton or less. Adding to this \$3 for freight and 75 cents for import duty the cost of coke at the blast furnaces would be \$5.25 a ton. With the freight on iron and steel from the Pacific coast to the eastern Asia countries costing \$3 a ton, the cost of manufacture here to be even with Pittsburg would be \$13.40 for iron and \$18.40 for steel.



Hillside Mine, Bristol, Lincoln County, Nevada. (See page 164.)

These last figures, it would seem, can safely be taken as an upper limit of cost of manufacture on the Pacific coast to successfully compete with manufacture at Pittsburg. They are \$5.90 a ton higher than the Pittsburg costs. The Pacific coast has iron ore deposits of enormous extent and superior quality. They can be laid down at the blast furnace as cheap as at Pittsburg. The same mechanical economies that have reduced costs at Pittsburg are equally practicable here. The difference in the end then comes down to the difference in the cost of labor and of fuel. With coke from China or Siberia at \$5.25 a ton the difference in fuel cost would be per ton of iron between \$3.50 and \$4. The difference in labor cost which would have a constant tendency to disappear could not exceed 75 cents a ton. Deducting these two from the \$5.90 margin, there is still a possible margin in flat competitive costs in the common Oriental market of \$1.25 to \$1.50 a ton. In the Pacific coast market the possible margin is from \$2.35 to \$2.60 a ton.

The preceding has considered the entire proposition of iron and steel manufacture on this coast from the safe standpoint of the known. It is possible and probable that Alaska may be able to supply coke at a lower cost than the Chinese estimated on. It is possible that California petroleum may be successfully used as a substitute for coke and at a lower cost. In either case the Pacific coast industry would not have to take into account the Asiatic market, but could be developed for the home market. British Columbia coke from Crow's Pass could hardly be delivered on the Pacific coast cheap enough to keep the cost of iron and steel production within the limits noted above.



The Smelting Works at Pioche, Lincoln Co., Nevada. (See page 164.)

MINING AND SCIENTIFIC PRESS.

ESTABLISHED 1860.

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San Francisco, October 19, 1901.

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A Parasitic Mining Scheme.

A short time since the MINING AND SCIENTIFIC PRESS had an examination made, at a considerable expense, of the Ketchikan district, in southeastern Alaska, by a mining engineer, and published his report in this journal. In doing so it followed out its uniform policy of obtaining and publishing, in the early period of a new district, accurate technical and commercial information regarding it.

The enterprise of this journal has been promptly appreciated by the theft of the article and its mutilation to promote the sale of one of the parasitic stock swindling schemes that breed on the opportunities to dishonestly offered by new mining districts. From The Mining Journal, published in Ketchikan, Alaska, is quoted the following:

The Gold Coin Mining Company has raised the price of its stock from 7 to 15 cents per share. If there has been any development on the property to warrant such an advance, The Mining Journal is not aware of it. The fact is that, though this company (the home office of which is at Tacoma, Wash.) has been peddling out its stock for two years or more, no more than the annual assessment work has ever been done on any of its claims. The concern begins to smell bad, and it would be just as well for those who are solicited to buy its shares to take time for investigation. This plain statement of the truth is prompted by the dishonesty of a Seattle, Wash., mining publication, which, having appropriated as its own the very able paper descriptive of the Ketchikan district recently printed in the MINING AND SCIENTIFIC PRESS, an installment of which appears on this page, is guilty of still greater dishonesty in that it incorporates in the stolen article a lying statement referring directly to the Gold Coin, that "active development work is being done on this mine, which gives promise of being one of the big dividend payers of the district." The truth is, as we have stated, no development work has ever been done on the Gold Coin property; that company has no mine or mines, nothing in fact that gives promise of becoming one of the big dividend payers of the district. So far this year it has not even done the assessment work required by law. It has absolutely nothing which will justify the sale of shares at any price whatever—not as much, at least, as hundreds of individual claim owners who have equally as good prospects in better state of development. The property may, with a sufficient amount of money judiciously expended, be developed into a profitable mine. The company, to say the least, is slow to prove its faith by its works in that direction.

Nothing can be added to the vigorous condemnation of the Gold Coin Mining Company made by the local journal. It states the facts regarding the pretended mines and lack of even pretense of mining.

This paper can only regret that its carefully prepared paper on the Ketchikan district, which did not mention the Gold Coin Mining Company, should have led it into the error of taking itself seriously. The promoters in Tacoma, Wash., last year used the stock for tips to barbers, bootblacks and restaurant waitresses. Seven cents or fifteen cents a share, clearly the Tacoma mine for the promoters is more dividend paying than the Gold Coin mine to the stockholders.

Economic Geology of California.

There are some interesting problems to be worked out in the geology of California, particularly in the relations of the areal geology to the economic, as the U. S. Geologic Survey differentiates the phenomena. Much has been done in this direction with the opportunity offered by the Mother Lode system, and some very excellent deductive work has been accomplished with small areas like the Grass Valley and Ophir Quartz districts. All of it together is, however, but a good beginning, in comparison with the magnitude of the field.

Considering only the northern and central portions of the State, the region of the Sierra Nevada mountains is characterized with a series of lode systems, each a duplicate of the Mother Lode system in the general lines of fissuring. That is to say, the Mother Lode system of metal-bearing quartz veins is one of a type merely, distinguished only by differences in degree. These systems of lodes have a general parallelism of strike, and are notably parallel in strike to the main axis of uplift of the mountains. The general direction of this strike is north-northwest and south-southeast. Another characteristic is also observable. The extreme western vein system, belt or line of ore deposits is distinctively copper-bearing, while the other systems are equally distinctively gold-bearing, with a possible exception to this in the extreme eastern system of lodes, developed in Plumas county and extending into Washoe county of Nevada, which is again distinctively copper-bearing. Locally there are some minor systems of gold-bearing lodes running with the two distinctive copper-bearing systems; and, on the other hand, there are some copper-bearing veins running with the several great gold-bearing lode systems. The exceptions, however, do not tend to minimize the suggestion of the dominant mineralization in either case.

Northwestern California has a mountain system, as a geological entity, entirely separate from the Sierra Nevada mountains. Generally designated as the Coast Range, the more specific name would be the Klamath mountain system. Unlike the Sierra Nevada, it has several lines of uplift. These are roughly parallel to each other and have generally, but not exclusively, the same north-northwest and south-southeast strike as the main axis of the Sierra Nevada mountains. The metal-bearing deposits are, as in the case of the Sierra Nevada mountains, concentrated into several lines or bands of lodes. Like the condition in the other range, these lines or belts are roughly parallel to each other; but, unlike the Sierra system, they are not parallel to the lines of mountain uplift, but cross them at a sharp angle. The general direction of the Klamath mountain lode systems is north-northeast and south-southwest. This difference is suggestive of a greater age to the lode deposits than to the present mountain ranges, and undoubtedly has some bearing on the exceptional location topographically of some of the ancient gold-bearing gravels. The Klamath systems of lodes as a whole seem to show the same peculiarity as the Sierra systems. The extreme western and extreme eastern lines or belts are distinctively copper-bearing, and the intermediate systems are distinctively gold-bearing.

The extreme western line is so little known and explored that it has hardly been thought of yet as a "copper belt." Its southern end is not yet certainly known with exactness, but is either in central Humboldt county or possibly as far south as northern Mendocino county. Thence the belt extends north northeasterly, crossing the Trinity river and through the Red Top creek country, thence crossing northwestern Siskiyou county into southern Oregon in Josephine county. In this last district—Josephine county, Oregon—there has been considerable exploration and some exploitation. One furnace has been built and

operated. Lately discoveries have been made in Siskiyou county close to the State line. There are a number of late discoveries in Humboldt county, but there is the greater portion of the belt between the extremes which is as yet entirely unknown because entirely unexplored. It is a region which has not been prospected over for over thirty years, and possibly for a longer period. The residents, who are very few in number, have not prospected it, though they have found, as an incident of their residence, considerable rich copper-bearing float, without finding its lode source. The deterrent feature is the topography of the country and the absence of transportation facilities. There are not even roads in this middle section of this belt. Josephine county in Oregon and central Humboldt in California, having the beginnings of a transportation service, have received more attention from prospectors and miners. There is a possibility that there is in addition to the copper belt described another one still farther west in Del Norte county of California and Coos county of Oregon. A number of copper lode discoveries and developments seem to indicate this.

The extreme eastern lode system, or, rather, the two extreme eastern lines of lode deposits, are, like the extreme western, distinctly copper-bearing. Both of these are in Shasta county, California. The one first developed is in evidence at Iron Mountain, Balakalala, and in the Backbone creek copper-bearing deposits. The other includes the Bully Hill and the lodes found on Pitt river and north of it. The enormous economic development on both of these lines or copper belts is well known and their value well established. That the limits for exploration and prospecting have not been entirely covered also seems probable. This is not so much the case with the Iron Mountain copper belt as with the Bully Hill belt. It seems clearly worth the effort, for the chances of success offered, to prospect in the line of the Bully Hill copper belt to the northeast and perhaps to the southwest.

It is not probable that any great linear extent will be found. The direction of the strike may be considered as conclusive against this. Followed out, it leads into the vast mass of lava rocks which bury thousands of feet deep the older metal-bearing series. There seems no reasonable possibility of the existence of two parallel north-northwest and south-southeast copper belts extending from central Shasta county to southern Oregon, and there connecting through a curve. This theory appears to have the semi-official endorsement of the California State Mining Bureau, but its acceptance should certainly be qualified until the evidence on which it is based is declared. Meanwhile and afterward there remains the very interesting problem of the relation of the areal and economic geology of the California region for the study of geologists and miners. Enough has been said here to indicate that the solution can be made to return pecuniary rewards.

The annual report of the U. S. Geological Survey on the mineral resources of the United States shows some interesting facts, among others that the general prosperity of the country is affected by the condition of the country's basic industry; that when miners prosper the country prospers, and that when the mining industry languishes there are "hard times" all over the country. The two panic years of 1893 and 1894 are shown by the received U. S. Geological Survey report to have been years when there was a decline in the value of mineral products, and coincident with the increase in the country's mineral production in 1895 came increased wealth, work and general prosperity. The report shows that every year since 1891 there has been an increase in the annual gold output of the country, and that despite the fact that silver is about eliminated from politics it is by no means eliminated from the precious metal output, the production for the last fiscal year being within 333,457 ounces of the great 60,000,000-ounce production of 1893. The report deals with big figures, showing that the value of the mineral products of the country in 1900 was considerably over one thousand millions of dollars; and in this furnishes an unanswerable argument for the creation of a cabinet department, a bureau of mines and mining. Nothing has done more for the nation than the mining industry. Nothing has had less aid from the nation than the mining industry.

Concentrates.

IRIDIUM is the least expandable and zinc the most expandable of the metals in ordinary industrial use.

PLATINUM electrodes in a gasoline explosion engine do not become coated with unburned carbon from the vapor.

The Russian Government is reported to be preparing to patrol the Siberian coast on Behrings sea with war vessels to keep out American miners.

THE Transiberian Railroad, from St. Petersburg in Europe to Vladivostok on the Pacific ocean, is to be opened over its entire length on Nov. 8th.

THE switches of large currents of high voltage are broken in oil in order to prevent the formation of a destructive spark during the process of switching.

COKE made from Crow's Nest Pass, B. C., coal has been made which contains 91.97% carbon and 8.03% ash, as compared with Connelville, Pa., coke containing 86.88% carbon and 11.54% ash.

THERE is an alloy of nickel and iron, containing 36% of the former, which has but one-tenth of the expandability of platinum and one-thirteenth or one-fourteenth the expandability of iron or of nickel.

THE usual allowance of candles to a miner is two to a shift, sometimes three. A hard candle, burning with a short, clear flame, is more economical than softer grades that burn with long flames and smoke in air currents.

THE Colorado production of gold up to January 1st, 1901, is estimated at \$252,000,000, silver \$353,000,000, lead \$101,000,000, copper \$14,000,000; total \$720,000,000. The production of Cripple Creek district to date is \$113,859,287.

NICKEL STEEL WIRE used as a measuring tape will give a precision of rapid measurement of distances that is not possible with the steel wire tapes, owing to the latter being much more affected by changes of temperature.

HYDRAULIC MINING in Colorado tributaries of the Arkansas river has muddied the river water to an extent that the towns below dependent on the stream for their town water supplies are beginning proceedings to stop the mining.

THE Bay Counties Power Co. is transmitting an electric current for commercial power purposes from its generating station at Colgate, Yuba county, Cal., via Oakland to Stockton, Cal., a distance of something over 200 miles. This makes it the longest transmission line in the world. It cannot be regarded as the limit.

THE tenth annual convention of the California State Miners' Association will begin on the 21st inst., at Golden Gate Hall, 625 Sutter St., San Francisco, Cal. From the reports of the various county miners' associations, Secretary Benjamin expects that the attendance this year will be the largest in the history of the Association.

PLATINUM is the only known metal around which glass can be fused successfully. Without being conclusive, it would seem that it might be possible among the alloys of nickel and steel to find one having exactly the same expandability as glass, with a higher fusing point, which would then permit of the fusing of glass around it.

THE electrolytic process for making soda and bleaching powder is considered as having a superiority over the Le Blanc process, in that the product is much purer. There is no hydrochloric acid produced to make calcium chloride, and the 1% or 2% of impurity in the salt produced electrolytically consists only of sodium chloride, sulphide and sulphate. The latter impurity has been found in the commercial soda made by the Le Blanc process as high as 25%.

SILLS to timber sets in tunnels that cut through rock firm enough to hold up the posts are seldom placed. They are only occasionally used in drifts in gravel where the latter is at all compact. They are of no special advantage in swelling ground. It is preferable to let the ground have the floor of a drift to rise into. It relieves some of the strain on the post and cap timbers and the lifted rock can be easily removed from the floor by the pick and shovel.

IRON ORE has been found on a number of islands in Hudson bay off from the coast of Ungava by an exploration party. The district is little known, but will become accessible by the construction of a railroad from Winnipeg to James bay. Copper was discovered in 1897 in large quantities in the region west of Hudson bay, and between it and Great Bear lake. The deposits would require a railroad to Hudson bay to make them available. The country is said to be practicable for its construction.

THE cost of water power plants based on figures stated for Eastern United States and foreign installations averages between \$40 and \$60 per horse power, exclusive of dam construction, and with it included from \$60 to \$100 per horse power. While these figures are a rough guide for considering in the preliminary stage such propositions, they cannot be considered conclusive. Each proposed water power plant is economically only to be considered finally on the data of a special engineering investigation made of it.

THE total energy in each of two pounds of air is exactly the same, independent of the pressure on each, if the temperature is the same. The amount of available energy differs with the pressure. There is no machine

by which the energy in a pound of air at atmospheric pressure and 60° F. temperature can be commercially converted into work. For the pound of air at 60° F. temperature and 100 pounds to the square inch pressure there are many machines which will convert a portion of the energy into work.

STANDARD sizes and types of machinery for service about a mine and mill are to be preferred to special sizes or types. Duplicates of parts and of entire machines, in cases of urgent necessity arising from breakdowns—and such necessities about a mine or mill are always urgent—can almost invariably be obtained from stock without delay, while with special designs or sizes the required duplicates have to be made at the cost of considerable delay. It is wisest to plan in the first place so as to use standard sizes and types.

NATURAL CEMENT ROCK is an impure limestone which contains the proportions of lime and silica or clay which would be mixed to make a Portland cement. An impure limestone containing 45% of lime, 25% of silica, 5% of magnesia and 7% of iron oxide is a natural cement rock. Cement is made from it by grinding, burning and regrounding. It is less costly than Portland cement and will not stand the same physical tests. For certain classes of work it is a satisfactory material and has the advantage of cheapness over the Portland cement.

THE popular idea is that steel, such for example as rails are made of, is iron with some carbon. As a fact, however, the chemical analysis of steel will show other elements. An analysis that is typical gave, besides iron, carbon 0.521 of 1%, phosphorus 0.10 of 1%, manganese 1.05%, silicon 0.108 of 1%, sulphur 0.047 of 1% and copper 0.064%. These percentages are very small as percentages, but mean that in a ton of that steel there are 10.42 pounds of carbon, 2 pounds of phosphorus, 21 pounds of manganese, 2.16 pounds of silicon and 1.28 pounds of copper.

THE Supreme Court of California decision invalidating the new Code of Civil Procedure practically carries the same conclusion as to the Civil Code. The effect will be to nullify the provision which has been made for replacing lost stock certificates, and it may restore the old law of incorporation of mining companies. Under the old code, the fee of incorporation to be paid the Secretary of State is only \$10, no matter what the capital stock of the company amounts to. There should be quite a business in forming incorporations to supply the market after a statute increases the fees.

THE law regulating the appropriation of water in Montana is as follows: The person desiring to appropriate must post a notice in a conspicuous place at the point of intended diversion, and in this notice must state (1) the number of inches claimed; (2) the purpose for which claimed and the place of use; (3) the means of diversion, with size of flume, ditch or pipe; (4) the date of appropriation; (5) the name of the appropriator. Work must be begun within forty days and prosecuted with reasonable diligence. If the ditch constructed is too small to carry the amount of water appropriated the remainder is open to appropriation by another. No person can divert more than he has actually use for, no matter what his right is, if other parties with water rights want it.

THE riparian law of stream water flow, which is part of the old English common law, and as such has been transplanted to this country, is not as arbitrarily construed in denying the right of appropriation in England, where it originated, as here, where it comes in conflict with the State statutes granting rights of appropriation. In practice in England the riparian law is construed liberally. Compensation in kind is legal and its quantity the subject of contract or legal adjudication between conflicting interests. English practice permits the storage of water from flood surplus flows, provided that from the storage a normal low water flow be maintained. A water appropriator can store all the flow of a stream in one or several reservoirs and employ only one or part of one to make the compensating flow to the stream in the low water period.

THE word "can't" was left out of the engineer's dictionary many years since. The way to learn to do a thing is to do it. It is not the entire way, however. The beginner who would in the end lead must not only be able to do himself, but he must be able to guide others. This means the use of the brain, as well as the hand and the eye. It means study of what others have done and the intelligent understanding of what is studied. The beginner must realize, too, that it can never be all learned. There will always be more and more to learn ahead that study will save the doing of by the labor of the hands. The beginner must cheerfully realize from the beginning that he can put no hard and fast limit on the hours of study and work if in the end he would lead. Success and leadership in industry do not come to him who waits or lags, but to him who goes and does continuously and understandingly.

IN the cooling of steel the iron crystallizes out and the impurities concentrate in the more liquid or plastic portion, which on solidification forms a cement between the crystals which binds the whole together. The rate of cooling governs the size of the crystals in the first instance, and the reheating and annealing afterwards. The relative condition of the crystals and cement governs the adaptability of the mass to mechanical treatment, such as rolling and forging. Thus in cooling from solidifying point the cement is softer than the crystals at the

high temperatures, and consequently the harder crystals will flow in it under pressure and the mass can be easily worked; but the crystals are large and the grain coarse, and not perhaps coherent, so that the metal may be easily broken by shock. At a lower temperature the cement and crystals are of equal hardness, and any work, if heavy enough, on the metal breaks up the crystals or grain, and the material becomes tough through the interlocking of the two constituents. This temperature for a soft steel is probably about 1000° C., or an orange or bright red. At a still lower temperature, about 350° C., or blue heat, the stage of minimum plasticity is reached, and any work at this stage sets up strains through want of adjustment, and renders the metal liable to fracture. At or below straw heat, 250° C., steel becomes more plastic than at blue heat.

THE use of the word "crude" to describe the mining methods and apparatus of the early placer miners in California, or indeed anywhere else, seems inappropriate. The word "simple" would be more appropriate. The methods and apparatus that the old miners used obtained the gold that it was their purpose to get, and no methods or appliances could do more. They did not work all the placers, however, simply because the ones left would not pay wages to labor while now they can pay income to capital invested in complex specialized machinery. It may be well, therefore, to term the old methods, which it is well to remember are invariably the first used at any new discovery, "simple," in distinction from methods employed on other placers which are the reverse of simple. The word "crude" infers known inefficiency which can be expressed better by using just those words.

THE U. S. courts, in a West Virginia case, have ruled that an oil and gas lease in which the sole compensation to the lessor is a share of the product is not a grant of property in the oil or in the land until oil is actually produced, but merely of the right of possession for the purpose of exploration and development; and there is always an implied, if not an expressed, covenant for diligent search and operation. Under such a covenant where the lease contains a proviso requiring the lessee to commence and complete a well on the property within a specified time, such proviso and the time of its performance are of the essence of the contract, and it constitutes a condition precedent to the vesting of any estate in the lessee, without regard to the grammatical construction of the instrument. When the lessee makes no attempt to comply with such provision and evidences no intention to do so, at the expiration of the time stipulated the lease becomes forfeitable, at the option of the lessor, although by its terms it is for a definite term of years.

WHEREVER one operation can be so arranged to perform two or more useful services at less cost than the cost of the two services separately, an economy has been made. What is termed by-product production is of this nature. Coke is made by distilling the volatile matter away from coal. Recovering the products of distillation which have heretofore been wasted, a saving is made which reduces the cost of the coke. The use of the water pumped from a mine to supply power to operate the pump is an economy of this description. Liquefied air as such has been found to be too expensive of production to be commercially valuable on a large scale, but used as an intermediate stage it separates oxygen from the air for industrial use at a marvelously low cost. The process of electroplating with copper can be used with what are termed cathode bars of unrefined copper so as to effect the electrolytic refining by separating the silver and gold. This economizes to the extent that of two electrolytic depositions of the copper using power, one is saved, together with a cent of cost a pound.

THE "bucking" or difficulty had with starting up gasoline engines is very often due to the poor quality of the gasoline. Gasoline is one of the light gravity oils obtained from the fractional distillation of petroleum. Its standard gravity is 74 Baume. It should be uniform in quality, but the commercial gasoline is not. Frequently, as a result of the intentional mixing of two or more oils of less and more gravity, the standard gravity is made 74. Still more often the fractional distillation of the petroleum is so conducted that two or more oils, including some of less gravity and some of more gravity, are collected together and sold as gasoline, having the standard gravity. In use, starting with a full tank of commercial gasoline of the standard gravity, the material really being the mixture described, the engine starts without trouble. As it continues to run, there goes on in the carburetor chamber a fractional vaporization, the lighter oils separating out and being carried by the air into the explosion chamber. The heavier oils accumulate in the carburetor. So long as the engine is kept running and kept hot, the carbureted mixture continues to explode. If the engine gets cold and the attempt is made to start up again, it may "buck" and refuse to go, because the heavy oil vapor mixture cannot be exploded cold. The remedy is to avoid the difficulty by buying gasoline which is actually standard, and not a mixture which has the standard gravity as an accident. If the mistake is made of having the inferior article of gasoline, and the "bucking" can be suspected to be due to its defective quality, remove what is left in the tank and refill with a fresh supply. A very rapid blackening of the electrodes indicates an unduly heavy oil being exploded. By arranging a heating attachment so that the temperature of a heavy oil is increased, its vapor mixture can be made hot enough to explode when it would not explode cold.

The Title to Lodes in Patented Placer Claims.

The Supreme Court of California has just handed down a decision on this point in the case of the Cranes Gulch M. Co., plaintiff and respondent, vs. J. Scherrer et al., defendants and appellants, on appeal from the Superior Court of El Dorado county. The court's decision is as follows:

Action to quiet title to mining ground. Plaintiff claims under a patent for a placer mine, dated July 1, 1872. The defendants claim under a lode location made in 1897. Plaintiff's patent was based upon proceedings instituted May 9, 1871, and upon final entry and payment made Feb. 14, 1872.

The rights of plaintiff had their inception under what is usually called the Placer Act, dated July 9, 1870. This Act, though not repealed, was amended by adding a reservation of known lodes, and in some other respects by the Act of May 10, 1872, sometimes called the General Mining Act. In Section 10 it was enacted that the Placer Act should continue in force, except as to the proceedings to obtain a patent, which, it was provided, "shall be similar to the proceedings prescribed by Sections 6 and 7 of this Act for obtaining patents to vein or lode claims." It was further enacted in the same section, that all placer claims thereafter located should conform to legal subdivisions of public land surveys; "provided that proceedings now pending may be prosecuted to their final determination under existing laws; but the provisions of this Act, when not in conflict with existing laws, shall apply to such cases."

Defendants claimed under a location made of a lode some twenty-six years after the issuance of the patent. It is contended that the lode was a known lode when the application for the patent was made in 1871. The patent contained the usual reservation found in all patents issued under the Act of 1872, of veins or lodes known to exist at its date, within the described premises. Defendants had no claim to the premises at the date of the passage of the Act of 1872, or prior to 1897. It does not appear that there was any adverse claim to the placer location prior to that time.

Sections 6 and 7 contain rather elaborate provisions in regard to the application for a patent and for a contest. Section 11 provides for the case where a placer claim contains a lode within its boundaries. The placer claimant may purchase the lode if he chooses; but if a lode is known to exist within the placer, "an application for a patent for such placer claim, which does not include an application for the vein or lode claim, shall be construed as a conclusive declaration that the claimant of the placer claim has no right to the vein or lode claim; but when the existence of a vein or lode in a placer claim is not known, a patent for the placer claim shall convey all valuable mineral and other deposits within the boundaries thereof."

The first question of interest here is, does Section 11 apply to plaintiff's location, and does it authorize the reservation contained in the patent? It may be conceded that where no application for a patent had been made by a placer claimant, whose location and occupation were such that he could have inaugurated proceedings for a patent before the Act of 1872 was passed, he would be compelled to proceed under Section 11, and that the Act made his patent subject to the conditions there expressed. Possibly this would be true as to applications pending when the last Act was passed, provided payment had not been made and a certificate issued, but to make it apply to a claim when a certificate of purchase has been issued, before the Act of 1872 was passed, so as to include these reservations, would violate the provisions in Section 16 of the Act, "that nothing contained in this Act shall be construed to impair, in any way, rights or interests in mining property acquired under existing laws."

Upon payment of the price and its acceptance the applicant becomes vested with a complete equitable title and to a patent, which will convey to him the legal title. He is the real owner of the mine. His right is complete; only the evidence of his right is withheld. It has been held: "When the price is paid the right to a patent immediately arises. If not issued at once, it is because the magnitude of the business in the office causes delay. But such delay in the mere administration of affairs does not diminish the rights flowing from the purchase, or cast additional burdens upon the purchaser, or expose him to the assaults of third parties." (Benson M. Co. vs. Alta M. Co., 145 U. S., 431. See also Stark vs. Starrs, 6 Wall., 402, and People vs. Shearer, 30 Cal., 645.)

One of the contentions of appellants upon this point, if I rightly grasp it, is that lodes did not pass by a patent issued for a placer claim under the Act of 1870. This is based largely upon the language of Section 12, as numbered in the amendatory Act: "Claims usually called 'placers,' including all forms of deposits, excepting veins of quartz and other rock in place, shall be subject to entry and patent under this Act," etc. And it is contended that it is to be construed as other sections of the Act, of which it is made a part, had been construed. The Act, it is contended, authorizes the sale to a lode claimant of one lode

only. He gets no land save such as is required for the convenient working of his lode. If another lode or a placer were found within land taken by a lode claimant under the Act of 1866, of which the Act of 1870 was amendatory, the lode claimant would have no right to the other lode or to the placer. So here, it is said, the Act of 1870 only authorized the sale of a placer claim. Without entering the land or getting a patent the claimant could hold and work out his mine, but to hold it he was required to comply with certain burdensome conditions. The patent, it is argued, merely gave him title to his claim and relieved him from the burdensome conditions. He then owned his claim freed from the conditions and the liability to lose it by abandonment. But what he claimed was the right to mine that placer, and in terms the statute confines his patent to that. And this position is much strengthened by the rule of construction which requires all grants from the Government to be construed favorably to the Government and against the grantee.

Furthermore, it is said the same Act provides for the purchase of a lode claim and land necessary for its working at the price of \$5 per acre, and it is provided that no patent issue for more than one vein or lode, which shall be expressed in the patent issued. It is strongly urged that Congress could not have intended, while so carefully providing that no one person should be permitted to purchase more than one lode, to permit in another section of the same statute anyone to purchase a tract of land which may include many lodes at one-half the price per acre charged for lode claims.

All this is very plausible and persuasive, but the statute clearly authorizes the sale of placer lands in tracts not to exceed 160 acres, and that such tract shall conform to the system of public surveys. No provision is made for any reserved right in the Government, or for the disposition of the land subject to the rights of the placer claimant. The lode claimant gets a complete title to the lands within his patent, subject only to the express reservation which the law directs should be contained in the patent. No reason appears why a placer patent should not be construed in the same way, and the law has not expressed any limitation upon the estate, or authorized the officers of the Land Department to express in the patent any reservation. In the absence of a located lode within the limits of the placer claim, and of a contest, it would seem that the officers of the Land Department need only ascertain that there is a placer which may be entered as such.

The law of 1872 supplied an apparent defect in the law of 1866, as amended in 1870, by providing for a reservation of known lodes. This is calculated to protect the Government and to prevent the entry of lodes as placer, and thereby get lode claims for \$2.50 per acre.

The argument merely tends to show that the rights of the Government were not sufficiently protected by the laws of 1870, and the further provision made in 1872 in that matter seems to show that, in the opinion of Congress, without the express reservation, full title to the land would pass under the patent.

Deep Diamond Drilling at Johannesburg, S. A.

The deepest bore hole yet put down on the Rand at Johannesburg, Transvaal, S. A., is on the Turf Club ground, and was sunk by the Chester Diamond Drilling Co., using a Sullivan drill specially made for the service by the Sullivan Machinery Co. of Chicago, Ill. The illustration shows this drill in operation.



The hole was started in January, 1899, but stopped October 1 of the same year, owing to the imminence

of the war. The rods remained in the drill hole for twenty months while the war was going on. Their removal, on resuming work in May, 1901, was accomplished without any difficulty after the surface works were repaired. In starting up at this time, the full pressure of steam was applied at once. The rods took the strain and gradually and evenly slipped outwards, and continued to lift without a hitch until the entire length of nearly 2500 feet was removed.

This bore hole is the deepest hole put down. The Rand Victoria bore hole held the record on the Rand until exceeded by the Bezuidenville hole. The Rand Victoria bore hole struck the reef at 2400 feet, and about eight months was taken in performing the operation. The Bezuidenville bore hole was finished in December, 1895, and was the deepest at that date, the reef being struck at 3251 feet. The drill on the Turf Club ground is nearly 2 miles from the outcrop of the main reef. The Rand formation was cut within 25 feet of the depth at which it was expected to be struck, viz., 4800 feet.

The weight of the rods which did the boring was about sixteen tons. To prevent such enormous weight pressing too heavily on the carbons while drilling, the rods were suspended on a hydraulic cylinder, which allowed the rods to descend as desired; in fact, the weight of the rods could have been run at a pressure just sufficient to be felt, if necessary. The hole was sunk in 10½ months from the time the drill was put on the ground, inclusive of stoppages, but exclusive of the time the drill was hung up owing to the war.

The Commercial Production of Oxygen.

With the development of improved processes for the production of oxygen, the possibility of extending its uses in the arts naturally appears, and from a paper recently presented by the well known scientist, M. Raoul Pictet, before the Societe des Ingenieurs Civils de France, and published in the Memoires of the Societe, describes a method of obtaining oxygen cheaply from the air. He employs liquid air, basing the process on the difference in the boiling point of oxygen and nitrogen. Oxygen boils under atmospheric pressure at -183° C., and nitrogen at -195° C. The nitrogen thus vaporizes first. Unlike the Linde process, or some of its modifications, the Pictet process requires but an original charge of liquid air, and constantly renews this by the action of his process of procuring pure oxygen.

In the change of state from the liquid to the gaseous, the nitrogen and oxygen of which the liquid air is mainly composed, absorb heat from their surroundings. If these surroundings can be made to consist almost entirely of atmospheric air, this air jacket will be reduced in temperature, losing as much heat as is required for the vaporism of the original volume of liquid air. All that would then be necessary is a compressor to reduce the cooled air to the liquid state.

This, then, is the principle of Pictet's new process for the production of liquid oxygen. An initial mass of liquid is boiled by the heat delivered to it by a current of atmospheric air, the air first passing through a spiral pipe coiled around the reservoir containing the liquid air, and then through a second spiral immersed in the liquid. The liquid air slowly evaporates, the pure nitrogen first coming off, followed, as the temperature rises, by mixed nitrogen and oxygen, until finally pure oxygen comes off. In the meantime, the air which has passed through the spiral pipes has been lowered in temperature to the critical point, and requires but a feeble pressure to reduce it to the liquid state, and this pressure being supplied by a pump, there is obtained a supply of liquid air equal in volume to that with which the operation was started.

This can be repeated indefinitely, and as the apparatus can be readily arranged so as to render the operation continuous, we have as the only energy expended to produce the distilled gases that required to drive the compressing pump. Thus the quantity of liquid air which is evaporated each instant is replaced by an equal quantity, and no new supply is necessary.

It will be seen how at once this renders cheap oxygen a possibility. M. Pictet gives in his paper the elements of cost, and shows that oxygen 90% pure can be produced in commercial quantities at a cost of only 0.013 franc per cubic meter (\$0.07 per 1000 cubic feet).

If the air used in his process be mixed with carbonic acid, readily obtained from the waste furnace gases, a large quantity of solidified carbonic acid is produced as a by-product, and its sale is sufficient to defray all the cost of producing the oxygen, which is itself thus made the by-product. In the working apparatus the evaporated gases are collected in three holders, one containing pure nitrogen, the second for the mixed gases, containing about 50% of oxygen, and the third for the oxygen, about 90% to 95% pure.

The operation of the apparatus was shown to the Societe in complete working order, and in his paper M. Pictet gives the detailed thermodynamic computations of the heat interchanges, showing the full accordance of the process with theory.

The possession of cheap oxygen means a complete

revolution in many technical processes, and M. Pictet details a few of its applications; while many others will surely be developed.

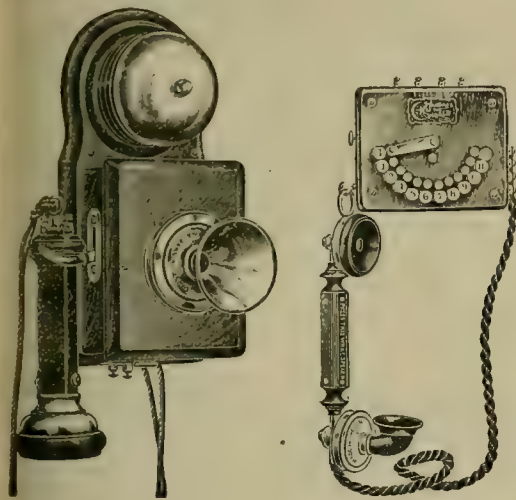
In connection with metallurgy many applications are suggested. Injected into furnaces it will produce the complete combustion of carbon, with intense localization of heat, if so desired. Used in connection with the vapor of water, it gives the most powerful reducing agents known, i. e., carbon monoxide and pure hydrogen, thus enabling the removal of all the injurious metalloids commonly associated with iron, such as phosphorus, sulphur, arsenic, etc.

In connection with forge work, the use of oxygen would permit an enormous saving of heat, due to the absence of the diluting nitrogen of the atmosphere, enabling temperatures of 2200° C. to 2400° C. to be quickly attained. The use of the oxyhydrogen blow-pipe becomes a commercial possibility for large work and welded seams and joints for structural work may in many cases replace riveting.

The well known reputation of M. Pictet as a careful and conservative scientist, and the high standing of the body before which his demonstrations were made, render the paper one of especial weight and importance, demanding instant attention.

Telephone Systems in Private Houses.

The private house of to-day, instead of being equipped with a speaking tube, as was the custom a few years ago, generally has a modern telephone system connecting the various departments with each other. The main advantage of the telephone



over the speaking tube is that one outlet or one phone can be used to communicate to all of the different stations, whereas when the speaking tube was used a separate mouthpiece was needed for each and every station. In locating these outlets for the telephone great care should be taken in placing them where they will be most convenient for the use of the household, and also where they will not interfere with the fittings of the house which are to be installed at a later date, such as radiators, sideboards, etc. A very convenient place is near the casing of the door, as it is almost impossible to place any heavy article of furniture near a door. Caution should be used in first discovering which way the door is to swing.

The wire cable which is used in connecting the various stations should run as far from the water pipes as possible, on account of breaks in the pipes which are liable to occur, and the moisture from which would injure the wires, make cross-connection, cause leaks of current and soon destroy the vitality of the battery. A cable having a waterproof insulation is also protected against injury from rodents, which gnaw ordinary insulation, and frequently cause crossing or grounding of wires, which is difficult to locate and is very annoying both to the owner and the electrician.

Wall pockets or receptacles for holding the telephone are very useful at the outlets, for while keeping the telephones fully covered they do not deface the walls, and by their use many of the connections can be made inside and a buzzer or a bell can be placed within for the purpose of calling that station. The telephone itself can be very small and compact and by using the hand microtelephone in connection with a selective switch (see cut), an instrument having capacity of fifteen stations, will occupy a space of only 4 or 5 inches square.

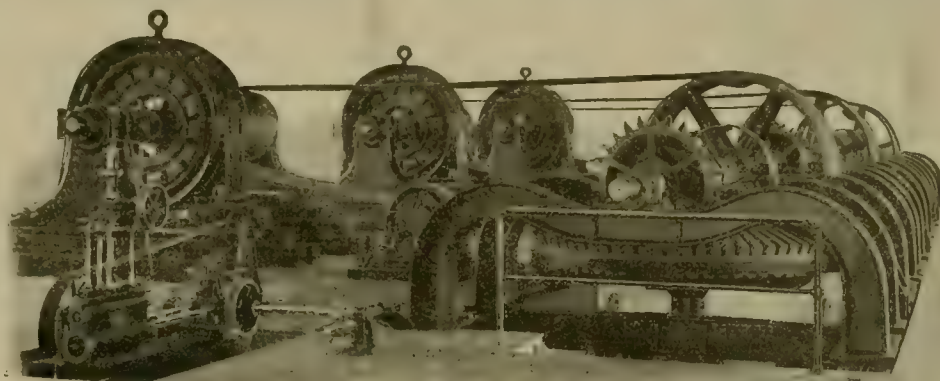
There is no limit to the flexibility of a system of this description, as any station can call all the departments, or it can be so wired as to call only a certain few. By a simple attachment in the owner's chamber the telephone system can be instantly converted into an alarm system and all the bells be made to ring at one time by the simple pressure of a special lever. This can be used in case of fire, burglars or sickness, and is very valuable in suburban residences.

The illustrations show two simple instruments which are adapted for household purposes and are reasonable in cost. These and other patterns can be obtained from the Ericsson Telephone Co., No. 296

Broadway, New York City, who sell their telephones outright and subject to no rents or other charges. The Electric Railway & Manufacturers' Supply Co., 68-72 First St., San Francisco, Cal., are Pacific coast agents.

An Idaho Electrical Installation.

Coal costing \$17.50 per ton laid down caused the Trade Dollar Con. M. Co., Silver City, Idaho, to recently obtain other sources of power. At Swan Falls, on the Snake river, affording available water supply, a masonry dam was built 450 feet long, 9 feet wide below the river bed, 5 feet wide above, affording a working head of 19 feet and furnishing power suffi-



Trade Dollar Con. M. Co.'s Electric Plant, Silver City, Idaho.

cient for three belt-driven Westinghouse generators operated by four vertical shaft 72-inch McCormick turbines developing 3000 H. P. The current from the generators is at 500 volts, and is raised by the transformer to 22,000 volts. The main three-phase transmission line is 27 miles in length. The S. Morgan Smith Co. of York, Pa., furnished the water wheels and all the machinery except the electrical apparatus and the governor. The latter is run by electric motors and operates the gates of the four water wheels, it working in connection with a lever gate hoisting device which the makers say makes it possible to dispense with all gears which are used in ordinary practice. The vertical shaft turbines drive one horizontal shaft through beveled pinions, the horizontal line shaft being belted to three generators of 300 kilowatts each and to two exciters of 20 kilowatts each. The work was done under the direction of A. J. Wiley of Boise, Idaho, and has been working satisfactorily since its construction.

In the northern parts of Finland, Russia, rich deposits of ozokerite, or natural wax, have been discovered. These deposits lie along the bank of the Kemioki, not far from Tornea, and are remarkable for their large proportion of paraffine, besides 6% of various resinous substances. Hitherto ozokerite has mostly been found in the Caucasus, Galicia and America, and these new deposits are believed to have a great industrial importance.

The Grill Patented Compartment Ore Drier.

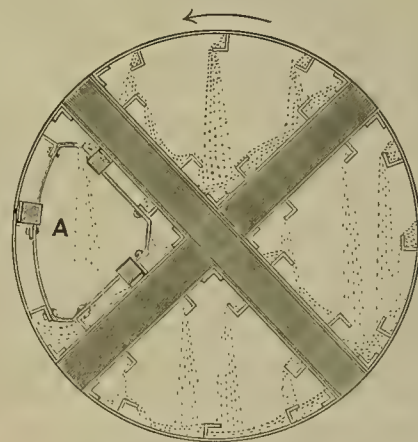
This device, which is here illustrated in view and transverse section, is intended for the drying of all kinds of ore in size from 1 inch diameter down to the finest slimes. The special feature is the division of the drier cylinder into four segmental portions, by

which the external surface is doubled and nearly four times as much surface is provided over which to spread the ore while drying. The material as it enters the drier is divided into four equal parts, so that it becomes thinly spread over a large area of surface.

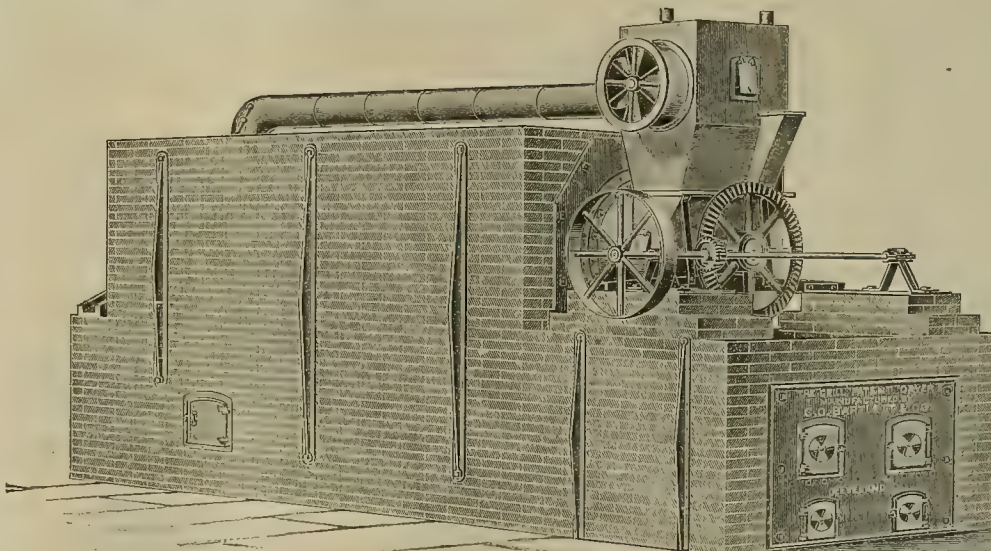
As the material passes slowly through the drier it is elevated and cascaded through each compartment, coming out perfectly dry and at a temperature of 150° Fahrenheit. The manufacturers, C. O. Bartlett & Co., of Cleveland, Ohio, say that the furnace is so constructed that the combustion of the fuel is complete, and its fuel heat utilized. When used to dry ores, concentrates and rock minerals the heated gases of the fire are passed through them, after ap-

plying the heat externally around the drying compartments. In drying coal or substances in which there is danger of combustion the heated gases are applied externally only. Where the material dried is very fine and light there is a settling chamber either on the top or on one side of the drier, through which all the vapors are drawn and any fine material which they contain settled.

With this drier the manufacturers claim that one pound of bituminous coal will evaporate from eight to fifteen pounds of water, so 125 tons of coal carrying from 8% to 15% of moisture, or 200 tons of concentrates carrying from 8% to 10% of moisture can be dried in twenty-four hours with one of these driers 48 inches in diameter by 28 feet long.



END VIEW.



The Grill Patented Compartment Ore Drier.

Possibilities and Limitations of Electric Pumping.*

NUMBER II.

By LEWIS A. HICKS, C. E.

August J. Bowie, Jr., has since reported on the same problem, and under changed conditions as to cost of materials, recommends separate electric motors with a double reduction of speed through belt and gears to the crosshead operating stock pump now in use, and provided with a steam generating reserve in case of accidents, resulting in even temporary shut down of the water-generated current; this precaution being necessary, because the cutting off of the drinking water supply from large herds of valuable cattle during the intense summer heat results in serious loss. The operation of the pumps is to be controlled from floats in the water troughs, and the entire plan has been developed with much ingenuity to make available the existing pumps and wells. The resulting operating expenses would be about the same as for the pneumatic system, the saving effected in either case being sufficient to reimburse the owners for the entire investment within four years. The combined efficiencies possible of attainment in such installations would appear ridiculously small, but that power applications can be made with great financial advantage in many locations ordinarily considered outside the proper field for such work, is well illustrated by the case in point.

DEEP WELL PUMPS.—A satisfactory head for deep-well pumps is a much sought for device and attempts to meet the want may be found in a dozen different designs, involving special arrangements of gears or cams, to translate rotary into reciprocating motion suitable for single and double acting deep-well and cylinder pumps. Electric applications have been made to all of these types, and the possibilities of even so insignificant an amount as 3000 gallons per hour for irrigation of fruit and vegetables need to be seen to be appreciated. Good economy can be secured by using such pumps properly set and connected, even on a very small scale.

PUMPING FOR IRRIGATION.—The statistics of the development of subterranean waters in this State during the past three years by means of pumps shows a most remarkable growth, which has been fostered largely by the contemporaneous electric developments from the water power of the Sierras. In the southern part of the State the high prices of citrus lands and prevailing scarcity of water has accustomed people to paying for it at rates only possible because of the great value of the products raised. Four cents per inch per hour appears to be less than an average charge and ten and twelve cents is not unusual. Under these circumstances, there is not the same stimulus to obtain high efficiency that exists where water is cheap.

Where water is 70 or 80 feet below the surface and pit pumps are used, attendants, if not properly trained, are apt to permit the whole place to become dirty and greasy, and, when this is so, it is safe to say that the oiling devices are imperfect, shafting is out of line, boxes are hot, trouble is more or less continuous and much power is being wasted against hard packing and other useless friction loss. In contrast, the air lift, with nothing accessible underground, shines as a model of convenience for the attendants, and in the minds of some of the irrigators with whom the writer has talked this consideration seemed to outweigh the loss incidental to the use of single stage air compression with plant efficiencies of 20% to 25%.

When, as in southern California, crops are entirely dependent on artificial water supply and are immensely valuable, the attention of the land owner is fixed on the possession of water at any cost, and the unit price becomes a matter of minor importance in the aggregate returns. Steam, gas and crude oil engines, in a variety of designs, compete with electric motors in driving air compressors, deep-well pump heads and rotary pumps of the Root type. At the present time not less than 45,000,000 gallons per day are being pumped from the Gravel Cone of San Antonio canyon, in the vicinity of Pomona, with a lift approximating 75 feet.

The power conditions may be understood from consideration of what should be attained in any properly designed installation under such conditions. In a recent test made by the writer on about the same lift, a performance of 200,000 foot-gallons per kilowatt hour was secured. Allowing for friction in delivery pipes, this would mean 200,000-85x540=4.3 miner's inches per kilowatt hour, or a revenue of 17 cents per kilowatt hour of exerted energy.

At Riverside hundreds of acres of sidehill lands, formerly above irrigating supplies, have been brought under cultivation by pumps with lifts ranging as high as 100 feet, and throughout the southern part of the State well water development has more than offset the decreasing perennial supply.

In the San Joaquin valley conditions are much more rigorous, as the comparative abundance of gravity water and smaller crop values have fixed a

lower unit price for irrigating water. Lifts, as a rule, are not so high perhaps by half, but this does not commence to overcome the discrepancy in prevailing water rates, which are as low as 1 cent per inch per day, and probably average 3 cents per inch per day. Under the most favorable circumstances the cost of pumping may drop as low as 3 cents per inch per day, but to attain such economy is impossible in any other way than with cheap electric power.

The Lindsay Development Co., of Lindsay, irrigating 1800 acres of orange lands, has recently installed a 50 H. P. centrifugal plant manufactured under the writer's supervision, which, on the basis of a flat power rate, from the Mount Whitney Power Co., of \$50 per horse-power year and continuous operation, delivers water against a total lift of 69 feet for 3½ cents per inch per day.

This plant, consisting of a horizontal shaft centrifugal pump, direct coupled to 50 H. P. 2000-volt induction motor on common cast iron base, is set in a movable wooden frame, capable of being raised and lowered to follow the changes in the plane of saturation. Under test, it developed a combined plant efficiency of 64%, without allowances of any character, and a pump efficiency of 72%—the best record ever encountered in the writer's practice. The runner is of the enclosed type, with outside vanes to assist in minimizing side friction, vacuum parts near the nozzle tips, and practically no clearance in the shell. Readings from indicating watt meters on both legs of the two-phase current were checked by volt and ammeters, and again with time readings from an integrating polyphase watt meter. Gauges were tested and checked against each other at different elevations. The plant discharges into a 15-inch pipe line, which delivers water at different elevations to the individual stockholders. A gate valve is provided at the pump house on the main discharge, so that constant pressure and discharge can be maintained at any one of the discharge openings, or the flow may be by-passed to a weir and direct measurement made of the flow at any delivery point by regulating the pressure, as shown by gauge, to agree with the pressure indicated when actual delivery is being made. This plant shows an economy of 202,000 foot-gallons per kilowatt hour, and represents the best attainment of centrifugal pumps within the knowledge of the writer, and offers a cheerful contrast to the performance of an air compressor plant in southern California, working at the same lift driven by Corliss compound engines, burning oil under tubular boilers, with economizer, feed-water heater, surface-condenser and first-class equipment throughout, which realizes a comparative economy of 83,000-foot gallons per kilowatt hour.

There are exceptional plants, however, where the economy of the best centrifugal pumps is exceeded. The Hermosa plant of the Chase Nursery Co., at Riverside, Cal., realizes an economy of 215,000 foot-gallons per kilowatt hour, and consists of a 20 H. P. motor belted to a rotary pump, which takes water from a small gravity ditch and rises it 100 feet through 1300 feet of 8-inch pipe.

A centrifugal pump installed at the same point in competition only realized 133,000 foot-gallons per kilowatt hour. It frequently happens that the point of best efficiency of a centrifugal does not coincide with the conditions under which it is required to operate, and the case quoted of a constant water supply and lift is an illustration of the necessity of expert consideration in planning and installing such machinery, if economical results are to be attained.

At Exeter a pumping plant has been installed for the irrigation of a tract of orange land, requiring the delivery of water at a height of 500 feet. An induction motor belts to a countershaft, from which two vertical triplex single-acting pumps are driven.

A horizontal triplex, single-acting pump is also in use in the Kaweah district, belted in the same way, the plungers working in an oil bath in a closed shell. No exact data as to the economic performance of these pumps is available; but, from comparison with other pumps of the same type, it is probable that they are good for 200,000 foot-gallons per kilowatt hour.

Another type of irrigating pump consists of screw runners, mounted from 5 to 10 feet apart on a vertical shaft centered in the well casing, in which it is inserted by spring steel guides which carry babbitted bearings in which the shaft rotates. The weight of the water column and rotating parts is carried on a piston rotating with the shaft and subjected to static pressure, or upon ball bearings.

Accurate tests by the writer under exceptionally favorable conditions of this class of pumps show a performance of 88,000 foot-gallons per kilowatt hour when electrically driven, and this result was checked against indicator cards from a steam engine substituted for the motor, and showed substantial agreement.

In general, the performance of the several types, so far as they have fallen under the writer's observation, may be compared as follows:

| | Per Kilowatt Hour. |
|----------------------|----------------------------------|
| Air Lifts..... | 65,000 to 85,000 foot-gallons. |
| Propeller Pumps..... | 85,000 to 100,000 foot-gallons. |
| Deep Well Pumps..... | 100,000 to 175,000 foot-gallons. |
| Centrifugals..... | 125,000 to 200,000 foot-gallons. |
| Rotary Pressure..... | 210,000 to 215,000 foot-gallons. |
| Triplex..... | 200,000 to 225,000 foot-gallons. |

Each type has a useful place to which it is adapted, and the best results can only be secured by careful consideration of the conditions peculiar to each installation and an accurate comparative knowledge of the apparatus available for the purpose in hand.

OPERATION OF MINING PUMPS.—Owing to the conditions under which they are operated, mining pumps are notoriously inefficient, and the sinking pump as now used, actuated by air or steam, is extremely wasteful of power. The question of adapting electric power for sinking purposes came to my attention in connection with the unwatering of the Comstock mines after the introduction of the Truckee power. The available working room in the shaft compartment used for pumping is only 4 feet square, and this limitation, together with the distance between the levels 100 feet, made necessary a somewhat novel assembly of centrifugal pumps and electric motors, for which the writer worked up in detail as a matter of professional interest.

The quantity of water to be handled, 3000 gallons per minute, required at least a 10-inch pump, and clearances prevented the use of runner larger than 22 inches in diameter. The maximum lift of 120 feet required about 150 H. P., while the size of shaft would not admit anything larger than a 40 H. P. motor with vertical shaft. The speed of standard 40 H. P. motors gave an economical lift of about 70 feet, so that to attain the maximum lift would require two such pumps compounded.

(TO BE CONTINUED.)

Reopening of Pioche, Nev., Mines.*

[STAFF CORRESPONDENCE]

Pioche and its mining industry are reviving after a long period of inactivity. Old store buildings are being replaced by new ones, and painters are busy improving the general appearance. The mines being reopened are largely those in the Bristol district, 20 miles from Pioche, whose ores are found to run high in copper, which was overlooked in the operations of the '70s, when all efforts were directed to the recovery of silver and gold. It is now claimed the copper values left in the mines and on the dumps exceed per ton those recovered in gold and silver in the early days. As the result of sorting over various dumps within the last year or two, Freudenthal Bros., lessees, shipped copper ore of the value of \$60,000 to Salt Lake City, Utah, the ore running in car lots from 25% to 35% copper, with considerable values in silver.

Within the past few months at least twelve of the old shipping properties of the Bristol district have been grouped together and sold to the Bristol Copper M. Co. and Hillside M. Co., at the head of which is W. Gelder of Denver, Colo. These include the May Day and Hillside, which will be remembered by old-timers as among the important producers of the early days of the camp. Active development has been commenced by these companies on four of the properties, the May Day and Great Eastern having been equipped with plants of machinery, including electrical equipment for light and for power drills. On the May Day the old 500-foot incline has been straightened up, provided with track and 1½-ton skips, capable of hoisting fifty tons per hour. Development and work on the levels are to be carried forward with Gardner electric drills.

The old shaft on the Great Eastern has been straightened from the surface to the 200-foot level, from which point a new shaft has been sunk to a depth of 400 feet. Recent drifting on the 150-foot and 300-foot levels have exposed good bodies of high-grade ore. From the 300-foot level a connection has been made with the May Day workings; and similar connection is being made between the 400-foot level of the Great Eastern and the May Day. The breast of the latter work is said to be in a good grade of smelting ore. The two properties have a large tonnage of ore in the bins and on the dumps awaiting shipment. The workings of the old Hillside mine are being put in condition for work; and on the Oregon Short Line group a new shaft has been sunk into a body of ore carrying 50 to 100 ounces silver, 30% to 50% lead and 5% to 10% copper. A test carload of this, sent to Salt Lake City, Utah, ran 152 ounces silver, \$7.60 gold, 41% lead; another carload gave 68 ounces silver, 30% lead, 9.3% copper; still another car of selected copper ore ran 30%. This mine and the Hillside are on the same vein and a level is being run to connect the workings of the two.

Mr. Gelder and associates have leased the smelting plant at Pioche and the railroad from Pioche to Bristol camp. The latter is being ballasted and put in shape for new ties and track. The smelter is being remodeled and partially rebuilt under the direction of S. E. Bretherton. In addition to re-equipping and raising the two rectangular furnaces, a new furnace is being put in for resmelting the copper matte turned out by the other two. White-Howe revolving roasters have been put in. The ores of the Bristol district are of an oxide nature and the company is opening the Zero mine at Pioche, from which it is expected to obtain sulphide ores to mix with the oxides at the smelter. The same company has acquired the Bullion Bill group at Pioche, which is a producer of manganese ores, carrying gold, silver and lead. It is

* See illustrations front page.

*Submitted for discussion at the fifth annual convention of the Pacific Coast Electric Transmission Association, San Jose, Cal., June 18-19, 1901.

claimed that present workings show an ore body 200 feet wide, without encountering either wall. It is figured that these ores will supply all necessary fluxes of the kind required.

A company of New York people have bonded and leased the properties of the Pioche Consolidated, at Pioche, and have commenced development. They contemplate putting in a large pumping plant to unwater the various mines at Pioche. This enterprise has been promoted by E. F. Freudenthal of Pioche and A. T. Lewis of New York.

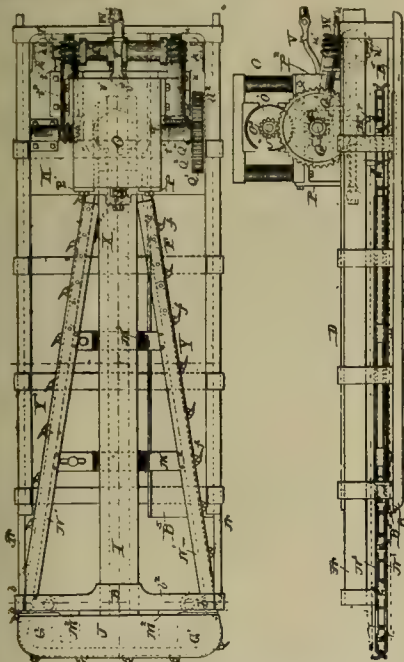
Pioche, Oct. 1.

Mining and Metallurgical Patents.

Patents Issued October 8, 1901.

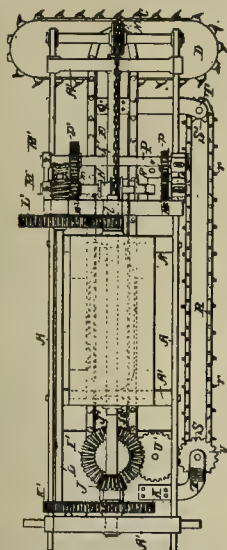
Specialty Prepared for the MINING AND SCIENTIFIC PRESS

MINING MACHINE.—No. 684,356; H. B. Dierdorff, Columbus, Ohio.



Relatively elevated longitudinal bed bars, carrying longitudinal racks and adapted to provide a carriage guide, an engine or motor and gearing, a platform or carrier for motor and gearing arranged to hold them as described, whereby they are partly supported above and partly below horizontal plane of aforesaid guides and racks, a relatively lower guide-way at front end of bed, a chain support in horizontal planes of front guideway and having two or more longitudinal bars connected to transverse braces which cross central longitudinal vertical planes of machine, and arranged to move forward and back without impinging on front guide, a cutter chain held by support, a rear driving sprocket wheel forming part of gearing, and two front wheels for chain, the wheels being arranged to hold chain on one side on a line tangential to periphery of driving wheel and to periphery of one front wheel and to hold chain on other side of a line tangential to periphery of other front wheel, and to periphery of driving wheel.

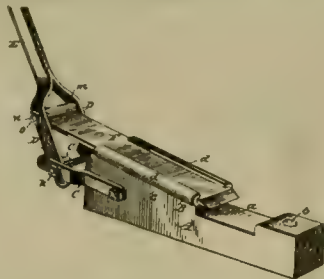
MINING MACHINE.—No. 684,375; B. A. Legg, Canonsburg, Pa.



An endless chain provided with cutters arranged to rotate throughout in horizontal planes, wheels for chain at ends of its cut, a driving sprocket wheel situated between end wheels engaging directly with endless chain, one or more cross bars or plates supporting wheels, a sliding non-rotary carriage rigidly secured to and supporting cross bars, a bed or

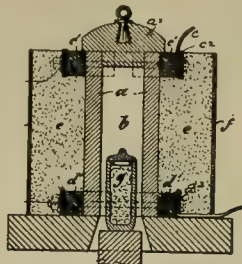
holder for carriage, means for moving carriage forward and back, and means independent of carriage-moving devices for actuating cutter chain.

MACHINE FOR MAKING WOODEN WEDGES.—No. 683,918; M. Edel, Haverhill, Iowa.



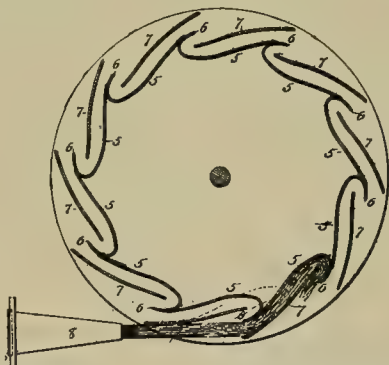
A suitable bed having a recessed seat for block of wood from which wedges are to be cut, a bearing plate having guide flanges secured to bed, a slidable knife engaging with flanges, brackets secured to sides of bed, a bifurcated hand lever pivotally connected to brackets and pivotally connected to knife.

ELECTRIC FURNACE.—No. 684,296; W. Nernst, Göttingen, and L. Glaser, Coburg, Germany.



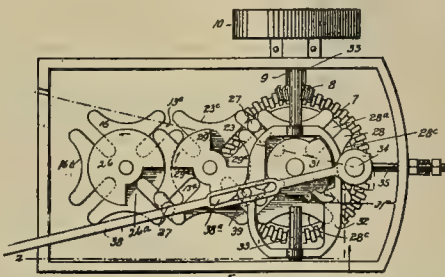
A working chamber constructed with a dry electrolyte to develop heat by agency of its resistance to electric current, conductors for supplying chambers with current and preheating means for exciting it, combination with chamber, conductors and preheating means of intermediary conductors composed of such metallic oxides as manifest some electrical conductivity at ordinary temperature and placed between chamber and supply conductors in intimate contact therewith.

IMPACT WATER WHEEL.—No. 684,045; F. H. Cook, Mead, Wash.



Parallel disks or heads, a series of fixed buckets between disks or heads, each bucket made U-shaped at one end and having its inner wall extending a considerable distance beyond free end of outer wall and a plate disposed approximately parallel with long inner wall of bucket and terminating within space between two walls forming U-shaped portion of bucket, long inner wall of bucket and guide plate forming an elongated channel for passage of motive fluid.

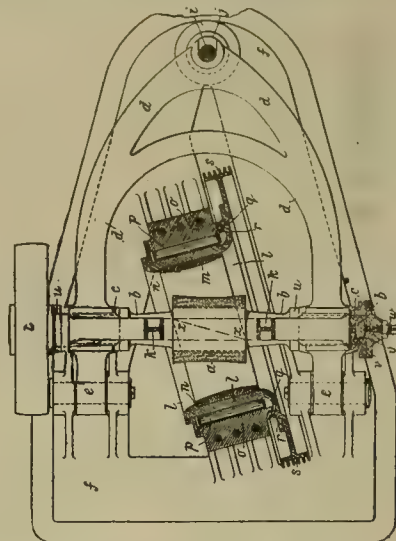
ORE SAMPLER.—No. 684,314; J. Scobey, Denver, Colo.



A bucket or device adapted to remove or divert a portion of material to be sampled as it is passed therethrough, a lever connected with the device, a wheel adapted to rotate continuously, a number of other wheels each provided with a number of slots, the rotary wheel having a projection adapted to successively engage slots of one of other wheels, which is thereby intermittently moved, and this intermittently moving wheel having a projection adapted in

turn, to engage successively slots of next wheel and impart an intermittent movement thereto and so on with any suitable number of slotted wheels, a gear mounted on last intermittently moving wheel of series, or one more remote in order of operation from rotary wheel, and provided with a tooth or cog, a yoke having an elongated opening in which gear is located, yoke having a tooth or cog on opposite sides of its opening, which is engaged by tooth or cog of gear as latter is actuated, whereby yoke is reciprocated, and a suitable connection between yoke and lever whereby latter is operated by former.

ROLLER MILL FOR CRUSHING AND GRINDING.—No. 684,148; J. C. Wegerif, London, England.



A roller rotating within and in surface contact with a revolving ring, axes of roller and ring being oblique to one another and in different planes, and acting external surface of roller and internal surface of ring being mutually of such relative configuration that a continuous line of bite between surfaces of roller and ring will be maintained notwithstanding their mutual axial obliquity, and a disruptive as well as a crushing action will be produced.

Getting Gold From Sand.

An appliance has been perfected in San Francisco for the reclamation of fine, flour-like and microscopic gold values contained in deposits of auriferous sands, as are found upon ocean beaches as well as in beds and upon the bars of rivers and streams. The process is the invention of F. M. Johnson of San Francisco and has been purchased by the Rose Gold Reclamation Co. for the purpose of operating it and placing it upon the market in this and foreign countries. They claim that the appliance is simple and inexpensive in construction and operation and does its work effectively, and that it is the application of a principle whose simplicity causes wonder that it was not long ago discovered and applied. They assert that it not only saves the gold, but the platinum as well, and does it at no greater cost than the ordinary expense involved in getting the sand and water into it.

The exterior of the invention shows a box of the ordinary sluicing pattern, built of 1-inch boards, 12 feet in length, 12 inches in width and 5 inches in depth. The interior (covered by patents applied for), designed to save the gold and platinum values, is a matter of arrangement rather than of material, the latter costing not to exceed \$1.50. Neither plates, mercury nor magnets are used. The owners state that two to three tons of sand per hour were run through one of these appliances day after day, consecutively, during a trial test of about thirty days upon the beach sands at Aptos, near Santa Cruz, Cal., and that all of the gold and platinum carried by the sands were reclaimed and saved, and that the gold saved in this test run averaged 400 colors of gold to the cent in value. They also state that in addition there have been numerous and exhaustive tests of sands from Nome, the Snake and Columbia rivers, of the beach sands upon the California, Oregon and Washington coasts, as well as those from the Colorado river.

They say that these boxes may be placed in batteries of five, ten, twenty or more, up to any number desired, and the sand and water may be put into them either by hand or with mechanical appliances, no further expense in operation being required, and that they may also be used as an adjunct to ordinary sluicing or hydraulic operations, with the result of saving the values in fine gold contained in the sand concentrates which are otherwise lost. The Rose Gold Reclamation Co. go on the proposition that the cost of putting the sand and water into these boxes (the latter often being made available by gravity) should not exceed 5 cents per cubic yard of sand in cases where the plant has a working capacity of 500 to 3000 cubic yards per day, and that deposits of auriferous sands carrying values in gold so low that they have been considered worthless may now be worked with satisfactory results. The field is practically limitless, not only in this country, but in others. The Nome district is of value, and there are many deposits upon the Alaska coast and farther south, in the vicinity of Vancouver, where large operations may be conducted. Upon the Washington, Oregon and California coasts are other deposits that are expected to yield handsome returns, while the Snake river and the Colorado fields are of considerable extent. The Rose Gold Reclamation Co. has opened general offices in the Claus Spreckels building, San Francisco, Cal.

MINING SUMMARY.

Specially compiled and reported for the
MINING AND SCIENTIFIC PRESS.

ALASKA.

JUNEAU.

The Nowell Co. is working sixteen men on the Glacier lode, and running its 30-stamp mill and compressor plant. F. T. Hammond is superintendent.

The Boston Group G. M. Co., at Juneau, have increased the capital from \$100,000 to \$150,000, to buy adjacent property. J. Wagner has been appointed manager.

NOME.

Statistics carefully compiled indicate that 9000 persons went to Nome this season and that 10,200 have returned or are returning, leaving about 4000 in the district for the winter—less than spent last winter there. There were eighty vessels, steam and sail, engaged in the traffic, carrying in over 60,000 tons. About \$4,500,000 gold has been shipped from Nome this season.

KETCHIKAN.

The Big Three group, bonded from J. M. Smyth, J. Brennan and D. Nicholls, by J. Freeburn and S. Lichtenstadter, of Ketchikan, consists of five claims, about 12 miles due west from the head of Karta bay, on Prince of Wales island. A well defined 3-foot-wide vein is exposed for 1600 feet.

PORCUPINE.

C. Stewart and J. Roberts of Seattle have bought of A. Anderson bench claim No. 6 of Cahoun gulch. The buyers propose to put a large number of men at work on the property next spring.

ARIZONA.

CHOISE COUNTY.

At the Calumet & Arizona mine, near Bisbee, a strike of rich malachite and azurite ore has been made on the 850-foot level. I. L. Merrill is superintendent.

GILA COUNTY.

The Old Dominion Copper M. & S. Co. is experimenting with crude petroleum at the smelting works at Globe to ascertain the cost of generating steam as compared with coal and wood. The oil being used is the last of a lot brought in there in 1893, when owing to the high cost its use was found to be impracticable. The present test will cover a month's time.

MOHAVE COUNTY.

F. Mitchell has made a carload shipment of 700-ounce silver ore from the Century mine at Chloride.

J. M. Murphy, of Kingman, is superintending the unwinding of the old shaft of the Payroll mine at Chloride preparatory to sinking it deeper and reopening the old levels.

PIMA COUNTY.

The Magnetic nickel mine near Tucson, owned by H. Melluish, is to be developed on a considerable scale.

CALIFORNIA.

AMADOR COUNTY.

At the Peerless mine, near Jackson, the crosscut west from the shaft on the 800-foot level is advanced 150 feet, and from 30 to 50 feet more is expected to develop the ledge.

Dooley Bros. have struck a seam in the quartz ledge owned by them near Ranlett, from which they took out over \$800 in a few hours.

BUTTE COUNTY.

Thirty men are employed on new buildings under construction for the Bay Counties Power Co., at French Creek, above Oroville. The dam in French Creek will be 120 feet high, 700 feet long on top and 70 feet at the bottom. A 6-mile long ditch is to be made to carry water from the reservoir to the power house. A new road 6 or 8 miles long will be made to haul machinery from Berry creek to the power house. Operations will soon be suspended until next spring.

CALAVERAS COUNTY.

P. Lancelle of Mokelumne Hill, in six days' work with a pan in a newly discovered channel of auriferous gravel in his claim, has taken out \$208 in heavy nuggets.

EL DORADO COUNTY.

The buildings at the Zantgraf mine, near Auburn, were totally destroyed by fire on the 14th inst. The fire started in the mill, and the hoist and a portion of the shaft were burned. The miners escaped through a tunnel at the 300-foot level. The loss will reach \$30,000 or \$40,000. The mine had only been started up a few days under new owners.

LAKE COUNTY.

The Sulphur Banks and the Abbott Quicksilver, in this county, and the Empire and Central, in Colusa county, com-

prising 3884 acres of land, have been bought by Eastern people for, it is reported, \$1,000,000, from R. A. Rodgers and W. Corbin of San Francisco and their associates. From the first two named properties it is said that \$2,000,000 in quicksilver was formerly taken out, but the Empire and the Central are only partly developed. The buyers are incorporated as the Empire Con. Q. M. Co. of New Jersey. The president is W. H. Dowe of New York. The present daily capacity of production is 175 tons of ore; but the new owners contemplate increasing this to 225 tons daily by the construction of new furnaces and further development, making the monthly product of quicksilver about \$140,000.

MONO COUNTY.

H. W. Nelson, Supt. of the Goleta M. Co.'s mine at Jordan, reports that the company has decided to resume work upon it. The Copper Mountain mine has been worked for a number of years and has a 40-stamp mill. The ledge is over 100 feet wide and carries some values clear across. Thirty-five feet of it, he says, carry about \$10 a ton.

NEVADA COUNTY.

Operations at the Grizzly Hill mine, near Nevada City, it is reported, will be commenced about the first of November. Supt. Hall has installed a water-wheel plant to operate the machinery.

The Sunflower mine, near Rough and Ready, is being worked by a Sacramento company. H. H. Look of Sacramento is president. They are installing a new 5-stamp mill, a hoist and other machinery. Twenty men are employed. Several shafts have been sunk on the mine, which it is said have developed good ore from the grass roots down.

Work at the Jupiter mine, at Iowa Hill, is going ahead steadily. Gravel is being breasted and the main gangway is being extended. Twelve men are employed. H. F. Calenberg is superintendent.

A new mill is to be erected immediately at the Home mine, at Grass Valley. W. C. Body of Grass Valley has the contract, and ten stamps will be added to the present twenty.

C. A. Giffin of Los Angeles has bought for Los Angeles people, in the Meadow Lake mining district, an interest in the mill and mine of L. D. Butts, J. M. Giffin and others. A new shaft will be sunk at once. Some new machinery will be put in and a large force of workmen put on.

At the last meeting of the Debris Commissioners held in San Francisco an application was made by G. C. Sargent of Dutch Flat for permission to work his claim by the hydraulic process. His plan for impounding the debris from the mine has been approved.

The Gold Crown Con. M. Co. at Omega is having the new shaft sunk rapidly. The mine is run by a steam hoist, and it is expected shortly to erect a mill.

PLUMAS COUNTY.

(Special Correspondence).—The Bushman placer mine, the property of C. D. Hazard, is sold, through G. T. Rives, to H. Epstein and others of San Francisco. The property is 5 miles from Quincy and has been a great producer.

Quincy, Oct. 14.
J. Spurgeon and V. Allen, formerly of Chico, but lately from Klondike, have bonded the Swiss drift mine near Prattville from B. Piazzoni, with an agreement to put in machinery and develop the property to the extent of \$15,000, for a half interest.

SACRAMENTO COUNTY.

W. P. Bonbright, H. G. Lunt and F. E. Brooks of Colorado Springs, Colo., have incorporated the Colorado-Philadelphia Gold Dredging Co., office at Colorado Springs, to operate the mines of the Pacific Gold Dredging Co., on the American river, near Folsom. The old company has had a dredger at work for a year with excellent results, and the new corporation has been organized to buy and put into operation immediately a new dredger with a capacity of 3000 cubic yards a day. The company's property consists of about 200 acres, and it is likely that additional acreage will be bought.

SAN LUIS OBISPO COUNTY.

The Oceanic Quicksilver Co., composed of Los Angeles people, has completed the construction of its 60-ton roasting plant and has begun operations. The mine is 7 miles from Cambria.

SHASTA COUNTY.

A crew of six dredger builders are at Redding from Port Huron, Mich., for the purpose, it is reported, of building a large dredger in the Sacramento river at Middle Creek, to mine for the gold carried down the creek into the river. The bottom, it is reported, prospects well.

The Mammoth copper mine, near Redding, has been sold by the bonders, J. Filius and F. G. King, to the Boston Exp. Co. of Boston, Mass., for, it is said, \$250,000, on a six months' option. The company, it is stated, will put a large force of men on the mine with the intention of building a smelter.

The Alta gold mine has been sold by Mrs. J. Wilson to F. Gates. The mine is near Furnaceville, about 35 miles east of Redding. At the time of its discovery, about two years ago, several thousand dollars was taken from a "pocket" near the surface.

Shasta county will be represented in the State Miners' Association in San Francisco, Cal., by 100 representative mining men. The Northern California Miners' Association has been organized at Redding. C. C. Bush is president and F. Hurst vice-president. The association will include several counties.

The Summit group of copper claims in Backbone district, near Redding, has been bonded to F. E. Ware of the Mount Shasta G. M. Co., who is believed to represent Chicago people in the matter. The owners of the Summit group are M. E. Dittmar, G. Graves and W. Avery. The second option is on twelve claims owned by R. M. Sealtzer and J. Smithson.

The Bully Hill smelter at Salee is smelting at the rate of 150 tons of ore daily. The amount of Bessemer copper produced, in the form of plates or ingots, has averaged 350 tons per month since June 1. The rate is now increased to 400 tons a month. The company is making a shipment of 1600 tons.

H. H. Thompson of Old Diggings district and J. Barber are working the north portion of the Reid mine under lease. D. McCarthy of Keswick has a bond on the south portion of the property and is working.

SIERRA COUNTY.

The work of installing machinery at Rock Creek mine, at City of Six, near Downieville, has been completed and sinking resumed in the shaft.

SISKIYOU COUNTY.

J. O. Welsh of Mott has sold his placer mines at French creek, in Scott valley, to an Eastern company.

The Sheba mine, at Patterson creek, is now being worked by the Patterson Creek M. Co. A shaft is being sunk for development before taking out ore to crush. This mine is equipped with mill and hoisting machinery.

TUOLUMNE COUNTY.

By the closing down of mines owing to the shortage in water supply about 500 men in Tuolumne county have been thrown out of employment.

It is reported that the Lamphere mine, near Confidence, will be started up again soon.

The Hellsgate mine, located on the main Tuolumne river about 6 miles south of Carters, has been sold to V. Gianella.

The Starr King and Sherman mines, near Carters, have been sold to H. W. Jackson and F. H. Newton by the Sherman M. Co.

At the Hard Tack mine, on Hunter canyon, the vein is reported 3 feet wide and very rich in free gold.

The rich ore discovered in the Starr King mine is found in an 8-inch ledge on the 375-foot level, where the vein changed from white quartz to ribbon rock.

Practically all the mills in the county relying on water or electricity for power have been closed. The water supply held out for a longer period this year than for any previous year in the past ten years. Heretofore the supply would fail in August and sometimes in July. The improved condition and increased capacity of the water company's system of dams and reservoirs have made the supply this year hold out longer.

The Mohican mine, at Sonora, is showing ore of good value. The 5-stamp mill will soon be ready for service.

The \$37,000 pocket recently found in the Tany mine, at Sonora, was taken out in less than one day—one-third of all the material removed to get it being the gold.

YUBA COUNTY.

Supt. Haskell, of the Miller mine, near Forbestown, is building a 20-stamp mill for the mine. At present a drain tunnel is being run to tap the ledge 185 feet from the surface, near the bottom of the shaft, which is 200 feet down.

COLORADO.

ARAPAHOE COUNTY.

S. Newhouse is in Denver, figuring on the establishment of a new custom smelter, independent of the American S. & R. Co., and states that he will build an independent smelter in Utah, to handle ore from his own mines.

CHAFFEE COUNTY.

An independent smelter is projected to be constructed at Salida to treat the ores of mines not now shipping to the American S. & R. Co. The Ohio S. & R. Co. has been incorporated, capital \$3,000,000, with office in Denver. The directors are J. C. Kortz, T. Goodman, J. M. Thomas,

H. G. Redington and G. A. Steinbenner, who own the New Monarch mine at Leadville, which they claim they have not been able to work through the refusal of the smelting company to treat their ores.

CLEAR CREEK COUNTY.

(Special Correspondence).—The town of Empire is 1½ miles from Empire station, on the Colorado & Southern Railroad. It is situated near the north fork of Clear creek, at the foot of Cavode mountain, on the road to Berthoud pass, beyond which is Middle park. Near the head of a gulch, 1½ miles north of Empire, on Silver and Cavode mountains, are four important mines. They are the Gold Fissure, Silver Mountain, Gold Dirt and Conqueror. The first named is a new mine and is shipping twenty to twenty-five tons of ore daily to the Silver Mountain concentrator. The ore body is opened by a 95-foot crosscut from the 300-foot shaft.

The Conqueror was extensively worked thirty years ago for placer gold. It is now being further developed as a lode mine by E. F. Welles and associates. A winze sinks 100 feet at a point in a tunnel 400 feet from the entrance. At the bottom of this a 200-foot crosscut is being run to cut the vein, which is worked out at the higher levels. The ore values are principally in gold. An old mill on the property will be re-equipped as a concentrator.

The Gold Dirt mine and mill belong to the Empress M. Co. This is also one of the newly made old mines of the camp. It has a 550-foot shaft on the vein, with extensive drifting in both directions from it. Crosscuts have also been run to cut other veins. They hoist about thirty tons per day, nearly all of which is milled at the company's concentrator. The ores are an iron and copper sulphide, with gold values. The Tenth Legion mine is on the same belt.

The Silver Mountain mine has been closed down temporarily, but is expected to resume work soon. The concentrating mill which belongs to this property is located at the railroad, and is operating on Gold Fissure ore.

L. E. Davis has a group of fourteen claims on Eureka mountain, near town, which is said to cover a number of veins which have a northeast and southwest trend. He has done about 600 feet of tunnel work on one claim and developed good values in gold and silver, with some copper.

The Woodbury M. & M. Co. is doing considerable development on several mines in the district and have bought the old Atlantic mill, which will be put in condition to operate. R. S. Grier is manager.

The Empire Tunnel Co., of which E. A. Maxwell, F. P. Dewey and C. Jarbeau are manager, treasurer and secretary, respectively, with offices at Georgetown, has commenced operations at the foot of Cavode mountain. The tunnel, now in 560 feet, takes a northerly course through the latter mountain, the plan being to drive 10,000 feet, cutting 1600 feet below the surface. It crosscuts the known veins of that locality. The company have seventy claims located on the tunnel's course. At the entrance is a Leyner compressor plant, operated by a 6-foot water wheel, the latter driven by 95 feet head of water conveyed 2400 feet through a 2-foot pipe line.

WASCOTT.

Empire, Oct. 10.

(Special Correspondence).—The Kokomo-Pioneer M. & M. Co. are preparing to operate the Pioneer and Milton on Mill Creek gulch and the Kokomo, near Russell gulch. The first group is opened by tunnels and shaft, there being ore on two different veins. The Kokomo has a 300-foot shaft, considerable drifting, and has a steam hoist. The company's mill at Dumont, having thirty stamps, four Cammett tables, six Frue vanners and two gasoline engines, is being put in condition to start up this month in charge of Wm. Boardman. This mill may be run by water power part of the time, as it is equipped for it. They expect to make two grades of concentrates. E. H. Wilson is general manager of the company.

Dumont, Oct. 12.

GUNNISON COUNTY.

The 100-ton smelter building at White Pine is nearly complete. The Southwestern Smelting Co., composed of Denver and Chicago people, is putting it up. The plant is designed for low-grade ores, and is expected to blow in about November 1.

LAKE COUNTY.

While Leadville produced over 68,000 tons of all classes of ore in September, this tonnage could be considerably increased were the smelters in a position to handle the ore. In many cases shipments have been curtailed to half what could be handled were the smelters taking the ore.

The new shaft being sunk by H. I. Higgins on the Homer placer, at Leadville, is down 150 feet. It is experimental work on entirely virgin ground. Mr. Higgins

believes that the porphyry will be caught at about 250 feet and then a diamond drill will be put in to find an ore body before sinking the shaft deeper. The Homer placer is owned by the Leadville Tunnel and Drainage Co.

Work on the Twin Lake placer, which is being operated by the Arlington Syndicate of London, is under the management of N. A. Loggin. The estimated value of bullion produced in May was \$10,000, in June \$11,000, and the product of the year is expected to be \$75,000.

PUEBLO COUNTY.

The city of Pueblo proposes to enjoin the owners of the placer mines at Granite to prevent them from emptying their tailings into the Arkansas river. F. O. Harvey is the Supt. of the company which is putting the hydraulic tailings into the river. The mayor and city attorney were authorized to take immediate steps for the enjoining of the mining.

SAN JUAN COUNTY.

The strike recently made on the Ruby Trust mine, on Mineral creek, near Silverton, continues to improve. The ore body shows from 6 inches to 3 feet in width, and contains brittle silver, sylvanite, steel galena and copper sulphides.

TELLER COUNTY.

An old shaft on the Martha Washington claim, belonging to the Independence group on Battle mountain, at Cripple Creek, has been leased to C. Lambert and J. Sharp. The shaft is said to be the one at which W. S. Stratton made his original discovery of ore on Battle mountain. The shaft is down 80 feet but the lessees are understood to have the privilege of sinking it to 400 feet. They will install a steam hoist and begin active developments.

IDAHO.

BLAINE COUNTY.

A strike is reported at the Jumbo mine, near the bottom of the 80-foot winze, sunk from the lowest tunnel. The discovery is believed to indicate the downward continuity of the ore body mined above. The mine is near Halley.

BOISE COUNTY.

Returns from a carload shipment of ore from the Gold Eagle mine, near Neal, W. D. Southworth, manager, gave an average return of \$80 per ton. The ledge is large, and it is said one-fourth of it is shipping ore. The mill on the mine is run on mill grades of ore.

KOOTENAI COUNTY.

J. A. Evans of Pend d'Oreille has sold eighteen tons of dry silver ore for \$6000 net after paying freight and treatment charges. The ore came from the B. F. & H. mine, on Black Tail mountain, near Lake Pend d'Oreille. Mr. Evans is the sole owner of the mine and works it during the summer months with two or three men. The last shipment went 590.5 ounces in silver and 3.6% in copper. A shipment of sixteen tons made in April netted \$3280. The mine has been developed by about 400 feet of tunneling, and the ledge runs from 2 inches to 2 feet in width.

OWYHEE COUNTY.

L. Sorenson and G. Lewis have made a crushing of nineteen tons of ore from the Never Sweat mine at Silver City which yielded \$200 per ton. Sorenson & Lewis are preparing to put on fifteen men.

Grete Bros. have begun work on the San Juan mine, near Silver City. The shaft now being cleaned out and repaired was sunk more than twenty years ago and a considerable amount of high-grade ore was taken out of it.

LOUISIANA.

CALCACU.

An oil well, 3 miles from Welsh, that was capped, had the cap blown off and thrown 100 feet from the well. Rocks, water gas and oil were thrown 250 feet in the air, and for a lateral distance of a quarter of a mile. The top of the derrick was completely torn off. The well is now 200 feet deep.

MICHIGAN.

HOUGHTON COUNTY.

At the Champion mill site at Houghton the company is finishing the excavation. Foundations are completed. The mill walls will be constructed of concrete, gravel being taken from the shore of the lake, 2000 feet from the mill site, and conveyed to it by an inclined tramway. The pump will be 8 feet below the level of the lake, and the intake will probably be through a tunnel under the lake bottom.

The Calumet & Hecla Co. has drawn the pumps from shafts 16 and 17 on the amygdaloid lode. This, it is said, means the practical abandonment of this portion of the mine for a long time to come. The shafts are filling with water and only one shift is working in the amygdaloid part of the mine.

MONTANA.

CHOTEAU COUNTY.

J. Torkelson of Landusky, brings several hundred dollars in gold, the free-milling product of the first run of The Mission Peak M. Co.'s new 10-stamp mill at Landusky, which has been started up and run as a concentrator; it operates satisfactorily. The ore, it is claimed, runs about \$14 per ton, partly free milling, but most of the value going into concentrates and tailings, that will be treated by the cyanide process when that section of the mill is completed.

FERGUS COUNTY.

Ore has been struck in the "D" level in the mines of the New Year G. M. Co. at Madison. J. Meredith is superintendent. The tramway is nearly completed and the mill is expected to be started this fall.

JEFFERSON COUNTY.

The Sailor's Dream mine, 14 miles northeast of Butte, is owned by P. Kendrick and A. Boston, who located it about thirteen years ago. There are two veins, one 8 and the other 12 feet wide, and the ore averages about \$8 per ton. There are rich shoots in each vein, the ore of which is shipped to smelters. Other ore that averages \$20 is crushed in a Hendy 2-stamp mill on the mine. Kendrick & Boston do all of the work, first mining out a lot of fifty or sixty tons of ore, which they mill, stopping the mine till they have cleaned up and sold the bullion.

LEWIS AND CLARKE COUNTY.

G. Seiple and associates are working the Copper Queen and Copper King claims near Helena. At the bottom of a 50-foot shaft the ledge is from 6 to 11 feet wide, with a pay streak from 4 to 12 inches wide.

MADISON COUNTY.

The Mountain Chief & Blackwell Co. has suspended operations in the Homestake district. The company was running a 10-stamp mill on ore from its mine, but, it is claimed, could not save sufficient values to pay.

SILVER BOW COUNTY.

S. P. Alexander and R. R. Moore are proposing to save all of the copper values of the tailings from the various smelters in Butte. They claim that they can save all the copper in tailings that assay as low as 1% and make a profit, or can take copper ore, assaying as low as 1½% or 2%, crush it, then treat it by their process and make a good profit. The process they have employs reagents in leaching which are recoverable.

NEVADA.

WASHOE COUNTY.

On the Cabin claim of W. C. Williams at Olinghouse an area of two acres of surface averaging 2 feet deep is being plowed and the decomposed quartz shoveled into sacks and milled, averaging about \$25 a ton. It is estimated that there is \$80,000 on the surface in sight. The gold is coarse, mostly the size of a pin head, and from that to a pea.

In the Reno Star mine thirty tons of ore is taken from the 100-foot level by each shift. The estimated value of this output is \$2800.

NEW MEXICO.

COLFAX COUNTY.

The Ora Dredge Co. at Elizabethtown has completed its dredger and begun operations. The first cleanup from a two weeks' run is said to have amounted to several thousand dollars. The second and third are also said to have paid well.

GRANT COUNTY.

The Log Cabin mine, near Santa Rita, has been sold to J. Ritter of Pueblo, Colo., who has put men on beginning development.

W. H. Newcomb has bonded the Southwestern Copper Co.'s mine in the Burro mountains at, it is said, \$400,000.

The Clifton Copper Co.'s 100-ton mill at Santa Rita, operating on ore from the Wild Cat mine, has started up. J. L. Burnside is manager, J. Hodge mine foreman and C. H. Wilkie mill foreman. The machinery in the mill consists of two Huntington, one crusher, one roll, two Wilfley concentrating tables and two Standard concentrators.

TAOS COUNTY.

The Red River Copper Co. at Red River has installed a new diamond drill and other machinery and begun operations on the Anaconda copper mine at Red River City. The diamond drill will be used to locate veins which are supposed to exist on the company's properties.

OREGON.

BAKER COUNTY.

E. D. Tobin, manager, of Chicago, who is developing a mine near Bonanza for the Olive Creek M. Co., reports the cutting of

a 34-foot ledge of \$20 ore in the lower tunnel at a depth of 400 feet.

J. W. Carr, manager of the Oregon-Colorado M. & M. Co., which owns the Quebec mine, near Alamo, reports the 20-stamp mill at the mine as operating, and that the company is now considering the changing of the power at the mill from steam to water, for which purpose the company has bought water rights.

F. P. Hayes, of Philadelphia, Pa., managing owner of the Bonanza mine, which he bought last year from the Geizers for \$750,000, has bonded 60% of the stock of the mines to F. Moore, P. N. French, J. M. Patterson and E. A. Frenzel of Pittsburgh, Pa., on the basis of \$2,000,000 for the entire property. Deep shaft sinking is to commence at once.

JOSEPHINE COUNTY.

The McKay mine is situated at an altitude of from 4300 to 5100 feet, in the Siskiyou mountains, the boundary line of Oregon and California running through it. It was discovered three years ago and is now owned by W. H. Hamilton, S. H. McVey, L. F. Cooper and B. G. Adams of Crescent City, Del Norte county, Cal. It is located at the head of Joe creek, a tributary of Elliott creek. During the past summer a large lense of sulphide ore was uncovered at this mine.

Morris & Hosler have sold their half interest in the Powell Creek placer mine, near Grants Pass, to I. N. Haley of Philadelphia. Sharpe Bros. retain their interest. The mine will be worked on an extensive scale this season.

LANE COUNTY.

P. J. Jennings, president of the Helena M. Co. and the Musick M. & M. Co., located in the Bohemia mining district, announces that a railroad will be built from Cottage Grove, a distance of 35 miles through a region of heavy timber to the Bohemia mines. It is expected that construction work will begin this fall. Connected with this is the project of building a smelter, either at Portland or in the Bohemia mining district.

WALLOWA COUNTY.

Copper has been discovered in the most inaccessible mountains near the headwaters of the Imnaha river, near Cornucopia, Union county, by A. Neal. He says he has found a copper-bearing ledge 100 feet wide between well-defined walls.

SOUTH DAKOTA.

LAWRENCE COUNTY.

The shaft on the Holy Terror Co.'s mine at Deadwood is down about 1200 feet. It is stated that the vein on the lowest level is richer than on any of the upper levels. The Holy Terror Co.'s mill is now running with thirty stamps.

The Bismark mine at Deadwood, owned by the Elizabeth M. Co., has the northern extension of the Holy Terror vein. Under the superintendency of Manager Christopher a 40-stamp mill is being built, which will be ready to operate by November 1.

TEXAS.

There are now forty-six oil gushers in Beaumont, Tex., with a possible production of about 500,000 barrels per day, but the actual production of entire Texas field is said to be not much above 10,000 barrels per day, and oil can be purchased at the wells at 10 cents per barrel. The trouble is that there is a very limited market for the Texas oil product at the present time. The most recent developments are at Damon's Mound, about 100 miles southwest of Beaumont. Here a lighter gravity oil has been found and a 500-barrel well struck at a depth of 580 feet. About a half dozen wells are now drilling and land there has increased from \$1.60 to \$200 per acre.

EDDY COUNTY.

Report comes from Fort Stockton, south of Carlsbad, that petroleum has been struck in great quantities and that a large volume of gas is escaping. The oil was struck at a depth of less than 200 feet.

UTAH.

BEAVER COUNTY.

The Hub M. Co. has been incorporated, capital \$500,000, by E. E. Howell and W. J. Burns of Milford, O. H. Hardy, L. G. Young, O. W. Moyle and O. R. Hardy of Salt Lake. The company owns the Peyton group in the Star mining district.

BOX ELDER COUNTY.

The New Boston G. M. Co. has been incorporated, capital \$40,000. W. F. Smith is president and W. M. Clement secretary and treasurer. The company owns the Boston Nos. 1, 2 and 3, in Park valley.

The Raft River M. Co. has been incorporated by E. D. Woodruff, F. Eberhardt, G. H. Marley, C. C. Smith and J. R. Bowdler of Salt Lake City. The company has a bond on claims in Clear Creek mountains and on the Bald Hornet, New Year, Jose-

phine, Midnight and New Century mining claims, in Park valley.

SALT LAKE COUNTY.

The New England-Utah M. Co. of Chicago, Ill., has been incorporated under Delaware laws; capital, \$1,000,000. D. M. Dickinson of Chicago, Ill., is president. The company owns the Last Chance mine of eleven claims at Bingham. C. Hodge is manager.

WASHINGTON COUNTY.

W. Hatfield of Salt Lake City and J. C. Sullivan of Eureka have bonded the Adams group of copper claims near St. George at, it is said, \$75,000. It is understood that development is to be begun at once.

WASHINGTON.

FERRY COUNTY.

The Monroe G. M. Co. has commenced work on its mine in Republic. The company has a tunnel in 250 feet, and by continuing the tunnel in 70 feet the company expect to crosscut the first of two ledges.

OKANOGAN COUNTY.

Spokane and Okanogan county people have 1081 mining claims on Palmer mountain, at Loomis, including the Palmer Mountain tunnel. The Palmer Mount Mines Con. Co. has been incorporated, capital \$20,000,000 in preferred and common stock, to operate the mines. It proposes to issue \$10,000,000 of 5% gold bonds. Among the plans for future development it is contemplated to continue the present Palmer Mount tunnel, now in nearly 1 mile, to the town of Oro, a distance of 9½ miles. This tunnel will have a grade of 200 feet from Loomis to Oro. At the Oro end of the tunnel a smelter will be erected.

SNOHOMISH COUNTY.

The Bonanza Queen mine, at Silverton, has been sold for \$150,000 to a Minneapolis company. It is said a 200-ton concentrator is to be built.

STEVENS COUNTY.

C. Liungren, of the Cedar Creek Placer M. Co., operating on Cedar creek near Northport, states of the work the company is doing that at a depth of 10 feet they are taking out \$2.85 to \$3.75 per cubic yard. In places where the cement gravel is broken through the wash goes from 40 to 50 cents to the pan. He says they are putting in hydraulic works and will build a mile of ditch and flume.

FOREIGN.

BRITISH COLUMBIA.

T. James, representing a Minneapolis syndicate operating in the Lardeau, has come to San Francisco, Cal., to get a smelter plant for their Lardeau mining property.

A strike has been made on the Aurora, at Moyie. In the shaft, down 18 feet, the ledge widened to 7 feet of solid galena. The Aurora is owned by T. Roder, O. J. Johnson and I. B. Sanborn. Besides the shaft, there is a tunnel in over 300 feet.

Placer gold has been found on Lamb creek, which empties into Moyie lake, near Moyie. As high as fifty-six colors to the pan have been taken out on the surface.

Development work at the St. Eugene, at Moyie, is being done. No shipments are being made, but eighty-five men are employed.

A. L. Davenport of Spokane, Wash., has secured a working bond on the Bayonne claims, between Kootenay lake and the Pend d'Oreille slope, for Ohio people. The bond is reported to call for \$40,000 in a year—\$2000 down. The Bayonne group was discovered this summer by G. Harrison and F. C. Risdon of Ymir. The main vein is a wide one, consisting of free-milling quartz, carrying gold values. A number of samples assayed averaged \$60 per ton. The lowest was \$19.

MEXICO.

The Greene Con. C. Co. in September smelted 12,440 tons of ore and produced 1902 tons of matte, containing 930 tons of copper.

The Pan-American Mines Co. has been incorporated at Cripple Creek, Colo., to operate mines in the Guanajuato district of Mexico. The capital is \$120,000. The incorporators are J. M. Parker, E. H. McElhiney and R. C. Thayer of Cripple Creek, Colo.

J. A. Leonard of Denver, Colo., representing Boston and New York people, has bonded the San Miguel and Tuxtepec mines in the Ures district, near Soyopa, and proposes to open the mines and build a thirty-ton copper smelter. In the Tuxtepec ground are several ledges from 4 to 10 feet in width. In the San Miguel is a ledge 20 feet wide, carrying high-grade ores.

The Mexican M. & S. Co. has been incorporated, capital \$10,000,000, to operate mines in Durango. The office will be in

New York City. H. H. Brady, Jr., of Scranton is the principal party interested.

SIBERIA.

D. V. Evanoff, a mining engineer and geologist, has been examining the Siberian coast opposite Nome this summer. Her reports that he is positive, from the investigations made by him in Siberia, that there is gold there in plenty, and that it would soon be discovered if the country were but thrown open to American miners. He states that the mine-working season there will be considerably longer than that at Nome, on account of the more favorable weather conditions.

THE KLONDIKE.

It is reported that rich placer ground is being mined on Livingstone creek, in the Big Salmon district. It is said \$10,000 has been taken from one cleanup, three days' work of three men. The gold on Livingstone is reported to be very coarse. Livingstone has thus far made the best showing of any creek in the district.

Personal.

H. BRATNOBER is in San Francisco. A. W. HUTCHINS of New York is at the Washington mine, Forest Hill, Cal. W. F. NEWELL of San Francisco, Cal., is in Nevada looking for iron ore deposits. A. H. MAYNE of Joplin, Mo., is investigating the zinc ores at Park City, Utah. H. O. CHOATE, M. E., of Cleveland, O., has been examining mines at Silver City, N. M. L. D. FAY, M. E., of Houghton, Michigan, is examining a mine proposition at Park City, Utah. W. H. BREVOORT, manager of the Victor Jr. mine at Leland, Or., is in Salt Lake City, Utah. DANA HARMON has resigned as Supt. of the California mine at Gaston Ridge, Nevada county, Cal. H. S. SANDS is electrical engineer at the Seaton Mountain Light & Power Co., Idaho Springs, Colo. A. HAWKINS of Nevada City, Cal., has accepted an appointment as foreman of a mine near Tucson, Arizona. J. POUNDSTONE of Arizona has been appointed superintendent of the Gaston Ridge M. Co. in Nevada county, Cal. J. B. FLEMING, late of the Silver King at Park City, Utah, is now in charge of the mill of the Tesora mine at Tintic. L. V. DORSEY, superintendent of the Maryland mine at Grass Valley, Cal., has returned there from San Francisco, Cal. MARION AUBURY has returned to San Francisco from a reconnaissance through San Bernardino and San Diego counties, Cal. J. W. DUNLAP, Supt. of the Devil's Basin mine at Deadwood, Placer county, Cal., has returned there from a sojourn in San Francisco. CHAS. H. MORRIS, Georgetown, Colo., is manager of the Altura, Mexico-Seneca and New York & Colorado groups of mines at that place. C. W. RAYMOND, M. E., has resigned the superintendency of the Crystal Lake G. M. Co., operating at Meadow Lake, Nevada county, Cal. JAS. C. H. FERGUSON, Pacific coast sales agent The Midvale Steel Co., leaves San Francisco this week on a six weeks' visit to New York and Philadelphia. W. H. STORMS, author of "Mine Timbering," now superintending mining operations in Amador county, Cal., has returned to Sutter Creek, Cal., from San Francisco. PROFESSOR S. B. CRISTY, dean of the College of Mining, University of California, has been elected a member of the Institution of Mining and Metallurgy of Great Britain. N. D. PORTER of Chicago, Ill., has been appointed Supt. of the Stone Creek M. Co. at Dillon, Mont., taking the place made vacant by the murder of the former Supt., W. S. Millsbaugh. S. F. EMMONS of the U. S. Geological Survey, who has been during the summer making an examination of the Leadville district, Colorado, is now in Arizona examining the copper regions at Globe and Bisbee. CHARLES D. WALCOTT, director of the U. S. Geologic Survey, is now in Arizona, inspecting the work of the irrigation survey there, after which he will come to California, sojourning at Los Angeles and later at San Francisco.

Obituary.

C. S. BATTERMAN, Supt. of the Boston & Montana M. Co. at Butte, Mont., died in that city on the 7th inst., aged 45 years. Deceased was a native of Califor-

nia and a graduate of the University of California of the class of 1879. He was a mining engineer of high repute and had been connected with many large mining enterprises in Nevada, Colorado and at Butte, Mont., before he became Supt. of the Boston & Montana Co. Socially, he will be missed by a wide circle of friends throughout the West, who feel deeply his death.

Commercial Paragraphs.

THE Atlas pipe wrench was awarded the first prize at the Pan-American Exposition at Buffalo, as was also the Atlas tube cleaner.

THE Lunkenheimer Co., of Cincinnati, Ohio, has again carried off high honors, this time at the Pan-American Exposition, by being awarded the gold medal on valves, lubricators and engine fittings.

F. I. MATTHEWS, proprietor Bay City Iron Works, Oakland, Cal., has moved into his new three-story brick building, corner Third and Washington streets. The new works are equipped with modern machinery.

THE Standard Smelting & Refining Co. has contracted with the Colorado Iron Works, Denver, Colo., for the erection of a large concentrating plant on land adjoining the Val Verde smelter on the Agua Fria. The Colorado Iron Works is to make the machinery, erect the plant and turn it over to the Smelting & Refining Co. complete and ready for operation.

THREE heavy steam hammers have been added to the equipment of the Baker Iron Works, Los Angeles, Cal., to meet the increasing demands upon them for prompt deliveries of large forgings to their mining trade. Southwestern mining men find their orders are filled promptly from Los Angeles, and the Baker Iron Works is prepared to fill their orders understandingly.

THE Robins Conveying Belt Co. have been awarded a gold medal for their exhibits at the Pan-American Exposition at Buffalo, the highest award. At the Paris Exposition they received the Grand Prix. Their exhibits at Buffalo consisted of two full size 20-inch conveyors with automatic self-reversing tripper in operation in the Machinery and Transportation Building and two model belt conveyors, on a scale of 3 inches to the foot, with automatic self-reversing tripper, in the Mining Building. The conveyors have been in operation every day since the Exposition opened and have attracted considerable attention.

Books Received.

Volume VI of The Twenty-first Annual Report of the United States Geological Survey, 1291 pages in two parts, quarto, has been issued by the Government Printing Office at Washington, D. C. This volume of the Report has been prepared under the supervision of Hon. Charles D. Walcott, director of the Survey, by David T. Day, geologist in charge, and deals with the mineral resources of the United States, both metallic products and coal and coke for the year 1899. The work is exceedingly complete in its statistical features and includes comparisons with the production and more or less explanatory description of the resources of foreign countries. While much of the matter has been anticipated in the advance sheets, very properly published as they were written, and before the matters they treated of became of historical interest merely, the volume is a valuable addition to the live library of mining books, useful as reference on many points that have technical interest to the geologist and mining engineer and commercial interest to mine managers and operators.

Catalogues Received.

The Colorado Lamp Co., Denver, Colorado, send a handsome booklet descriptive of their electric incandescent lamps, and, incidentally, giving considerable information on incandescent lamps, voltage, candle power, etc. Illustrations and graphic charts add to the value of the treatise which will be sent anywhere on request.

Recently Declared Mining Dividends.

| | |
|-------------------------------------------------------------------------|---------|
| Rocco-Homestake M. Co., Nevada, monthly, 1½ cent per share, \$4500. | Oct. 12 |
| Modoc M. Co., Colorado, monthly, 1 cent per share, \$5000. | Oct. 15 |
| Gwin Mine Dev. Co., California, No. 26, 5 cents per share, \$5000. | Oct. 15 |
| Boston & Butte C. M. Co., Montana, quarterly, \$3 per share, \$600,000. | Nov. 1 |
| Con. Mercur M. Co., Utah, quarterly, 12½ cents per share, \$125,000. | Nov. 1 |

New Patents.

DEWEY, STRONG & CO.'S SCIENTIFIC PRESS PATENT AGENCY, 330 Market St., S. F., has official reports of the following U. S. patents issued to Pacific coast inventors:

FOR THE WEEK ENDING OCTOBER 8, 1901.

683,899.—PRESERVING FOOD.—S. Bishop, S. F.
684,045.—WATER WHEEL.—F. H. Cook, Mead, Wash.
684,052.—SNOW REMOVER.—H. S. Farquhar, S. F.
684,211.—FISH HOOK.—W. F. Forch, Los Angeles, Cal.
683,924.—ELEVATOR SYSTEM.—E. M. Fraser, S. F.
684,363.—WELL CASING.—F. A. Garbutt, Los Angeles, Cal.
684,369.—TEXTILE FABRIC.—W. A. Hagans, Los Angeles, Cal.
684,232.—WRENCH.—W. T. Hatten, Heppner, Or.
684,254.—SPEED GOVERNOR.—C. A. Huffmaster, San Leandro, Cal.
681,258.—CONCRETE BEAM.—P. H. Jackson, S. F.
684,275.—CAN HEAD COATING MACHINE.—A. W. Livingston, S. F.
685,075.—WEIGHING MACHINE.—Mackey & Gilbert, Rye, N. Y.
684,234.—DARK ROOM.—T. McCusker, Portland, Or.
684,293.—BURIAL CASKET.—J. C. F. McGriff, S. F.
684,297.—HINGE.—O. Niehaus, West Berkeley, Cal.
684,307.—ENGINE.—P. H. Reardon, S. F.
683,987.—ROTARY ENGINE.—M. J. Robinson, Los Angeles, Cal.
681,384.—INK WELL.—D. H. Rowe, East Oakland, Cal.
684,311.—BOAT.—S. R. Ruj, S. F.
684,312.—GARMENT HOLDER.—J. D. Rush, San Diego, Cal.
684,116.—MOP.—C. E. Shaw, Spokane, Wash.
684,322.—MOTOR VEHICLE.—A. C. Stewart, Santa Paula, Cal.
684,006.—GAUGE.—C. Stout, Pomona, Cal.
684,324.—BALING PRESS.—T. J. Thorp, Forest Grove, Or.
684,154.—WEED CUTTER.—J. D. Whitman, Medford, Or.
35,175.—DESIGN.—J. P. Budd, Everett, Wash.

Notices of Recent Patents.

Among the patents recently obtained through Dewey, Strong & Co.'s SCIENTIFIC PRESS U. S. and Foreign Patent Agency, the following are worthy of special mention:

INK WELL.—D. H. Rowe, East Oakland, Cal., as signor to True, Rowe & Co., of same place. No. 684,384. Oct. 8, 1901. This invention consists in a means for operatively attaching the cover to a fixed ink well, for the purpose of preventing dust from entering and to conveniently open and close the well. The top of the well is grooved about the circumference, has an opening in the vertical wall, and the cover has a depending flange to fit over the top, and has also an opening which is adapted to register with the opening of the well by turning in one direction, and by turning in the other direction, a projecting lip covers the opening in the well and seals it. The cover is retained in place by the ends of an elastic bail, which ends pass through holes in the cover and enter the circumferential groove. By springing these ends out of the groove, the cover can be entirely removed.

PORTABLE CONCRETE BEAM.—P. H. Jackson, San Francisco, Cal. No. 684,258. Oct. 8, 1901. The object of this invention is to provide a composite beam for use in connection with building. It consists of a flat metal tie curved from end to end, forming a bottom surface and having an abutting metal end or skewback, and a filling of concrete material resting upon the tie and extending between the end plates.

GARMENT HOLDER.—J. D. Rush, San Diego, Cal. No. 684,312. Oct. 8, 1901. This clothes hook or garment holder consists of a right-angled triangular piece of metal having a vertical portion adapted to bear against the wall or support; depressions formed in the horizontal upper portion and intermediate portions having a broad, flat top surface; the depressions having substantially horizontal bottoms and the walls inclined downward and outward to prevent the too easy detaching of anything hanging thereon. The inclined outer portion of the hypotenuse of the triangle has hooks also formed upon it, and the vertical portion has a means by which it can be secured against the wall.

AUTOMATIC CAN HEAD COATING MACHINE.—A. W. Livingston, San Francisco, Cal. No. 684,275. Oct. 8, 1901. The object of this invention is to coat the flanges of can heads with a sealing compound preparatory to subsequent insertion of the heads upon the can bodies. It comprises the reservoir carried upon a revolving support, a feed roller dipping into the reservoir, a distributing roller adapted to bear upon the side to be coated, a roller adapted to bear upon the opposite side of the flange, and means by which these rollers and heads are revolved, the head being actuated by a lever therefrom and delivered in a vertical position into a flaring trough. By means of an endless belt or chain the head is carried through this trough and is then in readiness for use.

VARIABLE SPEED GOVERNOR.—C. A. Huffmaster, San Leandro, Cal. No. 684,254. Oct. 8, 1901. This invention is designed to provide a governor by which the speed of an engine is controlled to any desired degree. It comprises a friction roller upon the sleeve of a governor, a driver engaging this roller and operating the governor, said roller being slidable lengthwise of the sleeve and radial of the driver. A spring keeps the driver automatically in contact with the roller, and means are provided by which the roller is moved upon the sleeve, and connections are made between the driver and the engine so that the latter is controlled at will, and the speed of the governor is varied inversely as the speed of the engine.

BURIAL CASKET.—J. C. F. McGriff, San Francisco, Cal. No. 684,293. Oct. 8, 1901. This invention relates to a receptacle for the bodies of deceased persons. It consists of a case comprising a single unitary structure devoid of lateral joints and of greater length than the body to be received, and means by which the case is opened, and the circular opening at one end; and a carriage or body support is arranged to be introduced through this opening, after which the opening is closed by a screw-threaded cap or head having an annular flange, and means for making a tight joint. A small opening is made in the opposite end of the case by which the steam or gas which the case may be tested, or preservative injected at will. The cap by which the main opening is closed has a suitable lock by which it is secured after being properly closed.

Latest Market Reports.

SAN FRANCISCO, Oct. 17, 1901.

SILVER.—Per oz., Troy: London, 26½d (standard ounce, 925 fine); New York, bar silver, 57½c (1000 fine); San Francisco, 57½c; Mexican dollars, 47½c San Francisco, 45½c New York.

COPPER.—New York: Lake, 1 to 3 casks, \$17.25; carload lots, \$17.00; Electrolytic, 1 to 3 casks, \$16.75; carload lots, \$16.62½; Casting, 1 to 3 casks, \$16.60; carload lots, \$16.50. San Francisco: 18. Mill copper plates, 20c; bars, 22c@23c. London: £65 5s per ton.

LEAD.—New York, \$4.37½; Salt Lake City, \$4.00; St. Louis, \$4.40; San Francisco \$4.90, carload lots, 5½c 1000 to 4000 lbs.; pipe 6, sheet 6½, bar 5½c; pig, \$5.25. London, £11 7s 6d per ton=2.47 cents per lb.

SPELTHER.—New York, \$4.20; St. Louis, \$3.75; London, £16 2s 6d per ton =3.58½ cts. per lb.; San Francisco, ton lots, 5½c; 100-lb lots, 6c.

ANTIMONY.—New York, Cookson's, 10c; Hallett's, 9c; San Francisco, 1000-lb. lots, 10c; 300 to 500 lbs., 11c; 100-lb. lots, 13c@15c.

IRON.—Pittsburg, Bessemer pig, \$16.00; gray forge, \$14.00; San Francisco, bar, per lb., 2.65c in small quantities.

STEEL.—Bessemer billets, Pittsburg, \$24; open hearth billets, \$26.50; San Francisco, bar, 7c to 12c per lb.

TIN.—New York, pig, \$27.50; San Francisco, ton lots, 28c; 1000 lbs., 28½c; 500 lbs., 28½c; 200 lbs., 28½c; less, 29c; bar tin, 30c.

QUICKSILVER.—New York, \$51.00 large lots; London, £9 2s 6d; San Francisco, local, \$47.50 per flask of 76½ lbs.; Export, \$45.00.

MAGNESIUM.—New York, \$2.90 per lb.; San Francisco, \$3.75.

ZINC.—San Francisco, 5½c; slab, 5½c; bar, 7c; zinc dust, N. Y., 8c.

BABBITT METAL.—San Francisco, No. 1, 10c.

NICKEL.—New York, 50c@60c per lb.

ALUMINUM.—New York, No. 1, 99% pure ingots, 35c; No. 2, 90%, 30c to 35c.

SOLDER.—Half-and-half, 100-lb. lots, 18c; San Francisco, Plumbers', 100-lb. lots, 15.25c.

PHOSPHORUS.—F. o. b. New York 50c@60c per lb.

ASSAY LITHARGE.—San Francisco, 10c per lb, small lots.

PLATINUM.—San Francisco, crude, \$19 per oz.; New York, \$20.50 per Troy oz. BISMUTH.—New York, 3½c, \$2.25 50-lb lots; San Francisco, \$2.50 to \$2.75 per lb.

FERRO-MANGANESE.—Pittsburg, 80%, domestic, \$58.50, large lots.

TUNGSTEN.—New York, 3½c, 95c; San Francisco, \$1.15.

FERRO-TUNGSTEN.—New York, 37%, 32c; San Francisco, 65c (60%).

POWDER.—F. o. b. San Francisco: No. 1, 70% nitro-glycerine, per lb., in carload lots, 15½c; less than one ton, 17½c. No. 1*, 60%, carload lots, 13½c; less than one ton, 15½c. No. 1** 50%, carload lots, 11½c; less than one ton, 13½c. No. 2, 40%, carload lots, 10c; less than one ton, 12c. No. 2* 35%, carload lots, 9½c; less than one ton, 11½c. No. 2** 30%, carload lots, 9c; less than one ton, 11c. Black blasting powder in carload lots, minimum car 728 kegs, \$1.50 per keg; less car lots, \$2 per keg.

CAPS.—3x, \$5.50 per 1000; 4x, \$6.50; 5x, \$8; Lion, \$9, in lots not less than 1000.

FUSE.—Triple tape, \$3.60 per 1000 feet; double tape, \$3.00; single tape, \$2.65; Hemp, \$2.10; Cement No. 2, \$3.00; Cement No. 1, \$2.65, in lots of 3000 feet and up.

CANDLES.—Granite 6s, 16 oz., 40s., 9½c per set; 14 oz., 40s., 8½c.

OILS.—Lined, pure, boiled, bbl., 74c; cs., 79c; and bbl., 74c; cs., 78c. Deodorized Stove Gasoline, bulk, 14½c; do., cs., 20½c; 86° Gasoline, bulk, 20c; do., cs., 26c; 63° Naptha or Benzine, deodorized, in bulk, per gal., 13½c; do., in cs., 19½c; Lard Oil, Extra Winter Strained, bbl., 75c; cs., 80c; No. 1 bbl., 50c; cs., 55c. Neatsfoot Oil, cooper's bbls., 60c; cs., 65c; No. 1 bbl., 50c@52½c; cs., 55c@57½c.

CHEMICALS.—Cyanide of potassium, 98%-99%, jobbing, 31½c@32c per lb.; carloads, 29c@30c; in 10-lb. tins, 40c; sulphuric acid, in carboys, 66½c B, 2c per lb.; soda ash, \$1.90 per 100 lbs.; hyposulphite of soda, 2½c@3c per lb.; blue vitriol, 5½c@6c per lb.; borax, concentrated, 7c@8c per lb.; chlorate of potash, 12c@13c; roll sulphur, 6c; alum, \$1.90@2.00; flour sulphur, French, 2½c@2½c; California refined, 1½c@2c; nitric acid, in carboys, 8c per lb.; caustic soda, in drums, 3c@4c per lb.; Cal. s. soda, bbls., \$1.00; sds, 95c per 100 lbs.; chloride of lime, spot, \$2.50@2.60; nitrate of potash, in kegs, 8c; caustic potash, 10c in 40-lb. tins.

COAL.—San Francisco, coast, yard prices: Wellington, \$9; Seattle, \$7.00; Coos Bay, \$5.50; Southfield, \$9.00. Cargo lots, Eastern and foreign: Wallend, \$8.00; Brymbo, \$7.50; Pennsylvania, hd., \$14.00; Scotch, \$8; Cumberland, \$12; Cannel, \$9.50; Welsh Anthracite, \$12.00; Rock Springs, \$8.50; Colorado Anthracite, \$14.50. Coke, \$16 per ton in bulk; \$18 in sacks.

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| California Dredging Co. | 2 | | | | | Taylor Iron & Steel Co. | 19 |
| California Electrical Works. | 9 | | | | | Taylor & Co., P. T. | 7 |
| California Perforating Screen Co. | 10 | | | | | Thorpe Mining Co. | 2 |
| California Vigorite Powder Co. | 5 | | | | | Trenton Iron Co. | 19 |
| California Wire Works. | 23 | | | | | Tyler, S. W. | 14 |
| Camerson Steam Pump Works. | 13 | | | | | U | |
| Canton Steel Co. | 8 | | | | | Union Gas Engine Co. | 15 |
| Cary Spring Works. | 20 | | | | | Union Iron Works. | 3 |
| Chinn-Beretta Optical Co. | — | | | | | Union Photo-Engraving Co. | 15 |
| Chrome Steel Works. | 20 | | | | | V | |
| Ciot & Crist Machine Co. | 11 | | | | | Van Der Naillen, A. | 14 |
| Colorado Iron Works Co. | 16, 18 | | | | | Van Wagenen, Theo. F. | 14 |
| Colorado Lamp Co. | 10 | | | | | Vulcan Iron Works. | 13 |
| Colorado Midland Railway. | 10 | | | | | W | |
| Colorado & Southern Railway. | 9 | | | | | Waratah Minerals Co. | 1 |
| Cooper, C. A. | 14 | | | | | Weber Gas & Gasoline Engine Co. | 21 |
| Copper King, Ltd. | 22 | | | | | Weigels Pipe Works. | 9 |
| Cory, C. L. | 14 | | | | | Welsbach Co. | — |
| Crane Co. | 17, 21 | | | | | Western Chemical Co. | 20 |
| Crocker-Wheeler Co. | 32 | | | | | Westinghouse Electric & Mfg. Co. | 7 |
| Currie, J. W. | 14 | | | | | Wetherill Separating Co. | 15 |
| D | | | | | | Whitney, H. | 2 |
| Davis Iron Works Co., F. M. | 13 | | | | | Wigmore & Sons, John. | 21 |
| Dearborn Drug & Chemical Works. | 15 | | | | | Willietta Mining & Milling Co. | 2 |
| Denniston's San Francisco Plating Works. | 10 | | | | | Wimmer, Geo. | 10 |
| Denver Engineering Works. | 15 | | | | | Wobler, Barting Suc's. | 15 |
| Denver & Blaine Co. | 15 | | | | | Wood, Henry E. | 14 |
| Denver & Rio Grande R. R. | 11 | | | | | Woodbury, Geo. E. | — |
| Dessau, S. | 8 | | | | | X | |
| Detroit Leather Specialty Co. | 2 | | | | | Yawger, I. O. | 8 |
| E | | | | | | Yuba Con. Gold Mining Co. | 2 |
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WANTED.—SITUATION BY A PRACTICAL mill man, assayer and cyanide man; is also a practical miner. Understands mine bookkeeping. No objection to Mexico. Best of references. Address W., care Mining and Scientific Press office.

A Civil and Mining Engineer (member American Society of Civil Engineers, member American Institute of Mining Engineers), at present general manager of a Western gold mining company, desires change. Will go anywhere. Examining or reporting, exploration work or operating. Address Box 264, Grangeville, Idaho.

MINING ENGINEER, graduate Mass. Inst. Tech., with thirteen years' experience as miner and surveyor for large copper company in Montana; superintendent of coal mine, washer and steam oven plant and railroad in South for six years; in charge of zinc property in Missouri; familiar with concentrating methods; at present in charge of cyanide operations of tailings pile in California, desires position with reliable company. Open for engagement after October 15. Address S. J. M., care Mining and Scientific Press.

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THE CALIFORNIA DEBRIS COMMISSION, having received applications to mine by the hydraulic process from G. F. Edwards, in the Philo Haven Consolidated Placer Mine, near Gold Lake, Sierra Co., to deposit tailings in Mud Lake, which drains into Frazier Creek; from the Purdy Creek Mining Co., in the Purdy Creek Mine, near Frenchtown, Yuba Co., to deposit tailings in Purdy Creek; from Edward Bryan, in the Chaparral Hill Gold Gravel Mine, near Onion Valley, Plumas Co., to deposit tailings in Borg Creek; and from the Norwegian Mining Co., in their mine near Tuttle town, Tuolumne Co., to deposit tailings in Jackson Gulch, gives notice that a meeting will be held at Room 59, Flood Building, San Francisco, Cal., on October 21, 1901, at 1:30 P. M.

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THE CALIFORNIA DEBRIS COMMISSION, having received applications to mine by the hydraulic process from the Calaveras Mining, Water & Power Co., in the Johnston and Scott Hill Mines, near San Andreas, Calaveras Co., to deposit tailings in Willow Creek; from Chas. Hilton, in the Calaveritas Hill Mine, at Calaveritas, Calaveras Co., to deposit tailings in gulches draining into O'Neill and San Antonio Creeks; and from Manuel Leal and A. Rose, in the South Honcut Mine, in Yuba Co., near Bangor, to deposit tailings in South Honcut Creek, gives notice that a meeting will be held in Room 59, Flood Building, San Francisco, Cal., on Oct. 28, 1901, at 1:30 P. M.

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ASSESSMENT NOTICES.

THE CALIFORNIA DREDGING COMPANY.—Principal place of business, 120 Sutter Street, San Francisco, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 15th day of September, 1901, an assessment (No. 2) of \$10 per share was levied upon the capital stock of the corporation, payable immediately in gold coin, to the secretary of the corporation, at the office of the company, Room 55 120 Sutter Street, San Francisco, California. Any stock upon which this assessment shall remain unpaid on MONDAY, the 21st day of October, 1901, will be delinquent and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 11th day of November, 1901, to pay the delinquent assessment, together with the cost of advertising and expenses of sale.

SAM. W. CHEYNEY, Secretary.
120 Sutter Street, San Francisco, California.

MARIPOSA COMMERCIAL AND MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Mariposa County, California.

Notice is hereby given, that, at a meeting of the Board of Directors, held on the 11th day of September, 1901, an assessment (No. 24) of Ten Dollars per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, Room 223 Crocker Building, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 21st day of October, 1901, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 11th day of November, 1901, to pay the delinquent assessment, together with the costs of advertising and expenses of sale. By order of the Board of Directors.

ALEX. GRANGER, Secretary.
Office—Room 223 Crocker Building, San Francisco, California.

TANANA MINING COMPANY.—LOCATION OF principal place of business, San Francisco, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 31st day of September, 1901, an assessment (No. 4) of ten cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, Room 801 of the Claus Spreckels Building, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 4th day of November, 1901, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 11th day of December, 1901, to pay the delinquent assessment, together with the costs of advertising and expenses of sale. By order of the Board of Directors.

EDWARD H. STEARNS, Secretary.
Office—Room 801 Claus Spreckels Building, San Francisco, California.

THE THORPE MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Fourth Crossing, Calaveras County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 8th day of October, 1901, an assessment (No. 11) of one (1) cent per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 632 Sacramento street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 16th day of November, 1901, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 8th day of December, 1901, to pay the delinquent assessment, together with the costs of advertising and expenses of sale. By order of the Board of Directors.

A. F. FREY, Secretary.
Office—632 Sacramento street, San Francisco, California.

YUBA CONSOLIDATED GOLD MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Nevada County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 12th day of October, 1901, an assessment (No. 4) of three cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin to the secretary, at the office of the company, Room 801 of the Claus Spreckels Building, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 19th day of November, 1901, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 16th day of December, 1901, to pay the delinquent assessment, together with the costs of advertising and expenses of sale. By order of the Board of Directors.

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Silver-Plated
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Tank,

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Bottom Discharge,

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DELINQUENT SALE NOTICE.

WILLETTA MINING AND MILLING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Tuolumne County, California.

Notice.—There are delinquent upon the following described stock, on account of assessment (No. 2) levied on the 19th day of August, 1901 the several amounts set opposite the names of the respective shareholders, as follows:

| Names. | No. Cert. | No. Shares. | Amt. |
|--------------------------|-----------|-------------|-------|
| H. L. Ladd..... | 32 | 1350 | 12 50 |
| William Nolden..... | 2 | 10 | 10 |
| William Nolden..... | 164 | 1000 | 10 00 |
| William Nolden..... | 107 | 1000 | 10 00 |
| William Nolden..... | 108 | 1000 | 10 00 |
| Frank E. Cordes..... | 144 | 1000 | 10 00 |
| Frank E. Cordes..... | 145 | 3000 | 30 00 |
| Frank E. Cordes..... | 146 | 750 | 7 50 |
| Frank E. Cordes..... | 147 | 750 | 7 50 |
| Fred M. Bowman..... | 9 | 500 | 5 00 |
| Carl Vogel..... | 19 | 100 | 1 00 |
| Charles Zissig..... | 20 | 10 | 1 00 |
| Charles Zissig..... | 65 | 250 | 2 50 |
| Charles Zissig..... | 71 | 250 | 2 50 |
| Harry H. Becker..... | 21 | 250 | 2 50 |
| G. W. Smith..... | 11 | 100 | 1 00 |
| Frank Quinn..... | 15 | 1000 | 10 00 |
| W. T. Rance..... | 59 | 250 | 2 50 |
| Robert Vincent..... | 60 | 1000 | 10 00 |
| Frank Fischer..... | 81 | 2000 | 20 00 |
| William F. H. Osmun..... | 87 | 5 0 | 5 00 |
| William F. H. Osmun..... | 88 | 500 | 5 00 |
| John P. Albro..... | 99 | 2500 | 25 00 |
| J. P. E. Heintz..... | 166 | 250 | 2 50 |
| George E. Stayton..... | 117 | 2000 | 20 00 |
| George E. Stayton..... | 118 | 2000 | 20 00 |
| George E. Stayton..... | 124 | 500 | 5 00 |
| M. Reubold..... | 6 | 10 | 10 |
| Alfred I. Levy..... | 14 | 1000 | 10 00 |

And in accordance with law, and an order from the Board of Directors, made on the 19th day of August, 1901, so many shares of each parcel of such stock as may be necessary, will be sold at public auction at the office of said company, Room 8, 206 Sansome street, San Francisco, California, on MONDAY, the 21st day of October, 1901, at the hour of 1:30 o'clock P. M. of said day, to pay said delinquent assessment thereon, together with costs of advertising and expenses of sale.

E. MCALLISTER, Acting Secretary.
Office—Room 8, No. 206 Sansome street, San Francisco, California.

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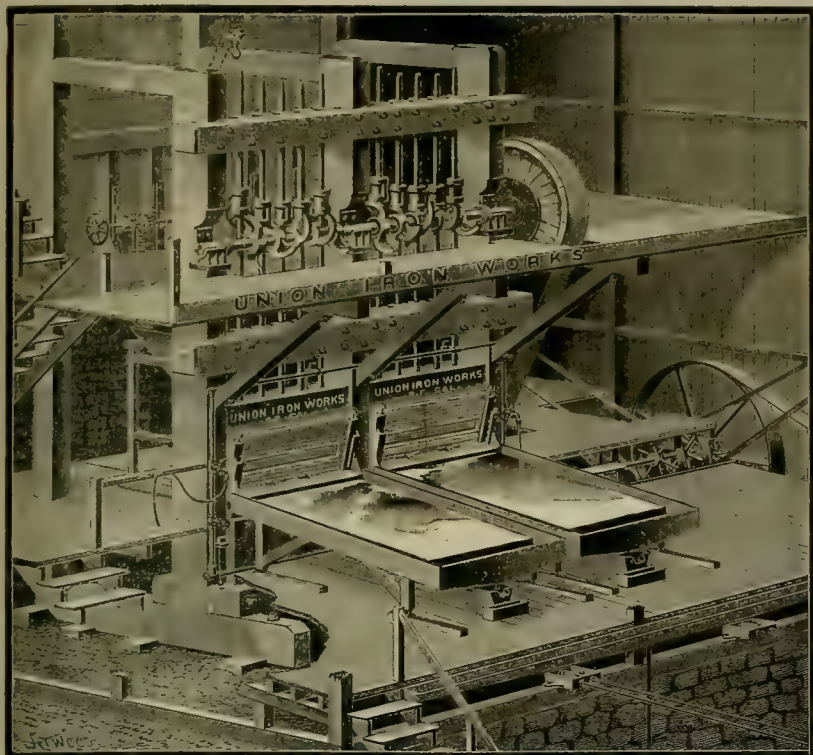
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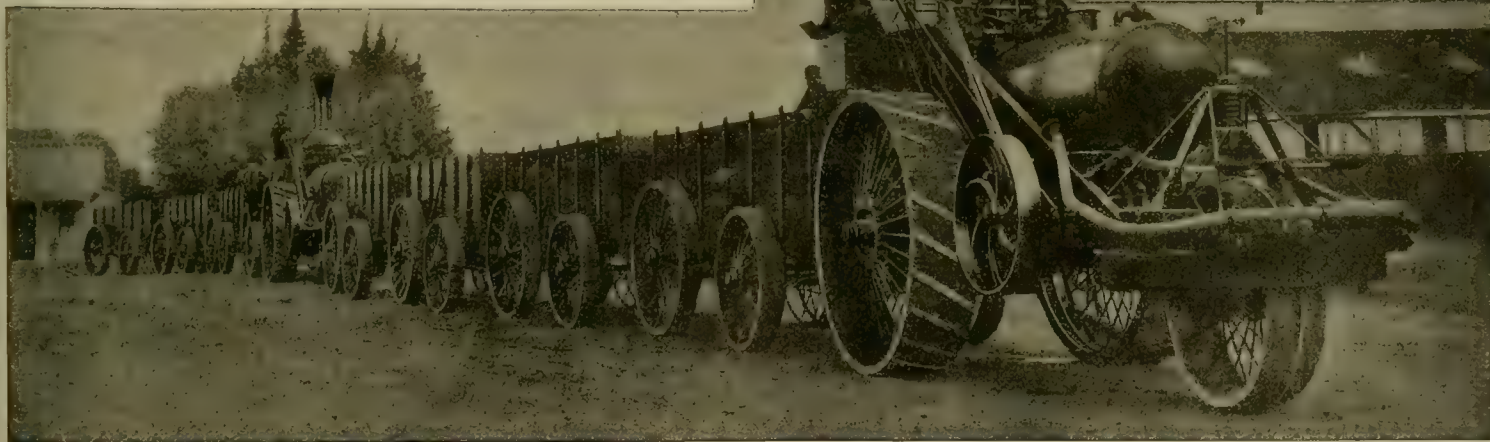
The illustration shows the details of a modern 10-stamp battery of the back-knee type, driven by belt and tightener from a shaft located upon the battery frame sills below the mortars and plainly illustrates not only the battery and its various parts, but also shows the ore-bin gate, feeders, copper apron plates and water piping, all in their relative positions.

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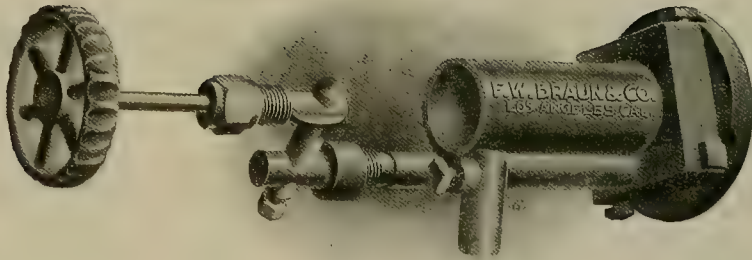
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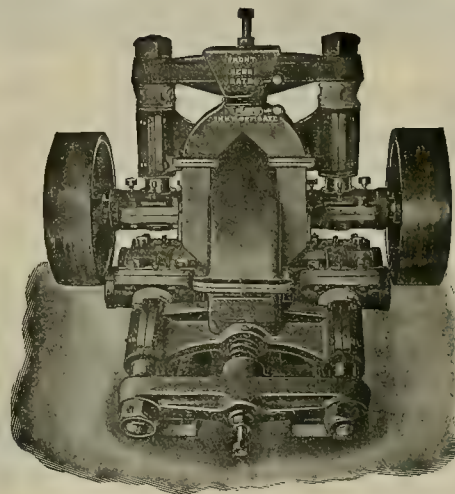
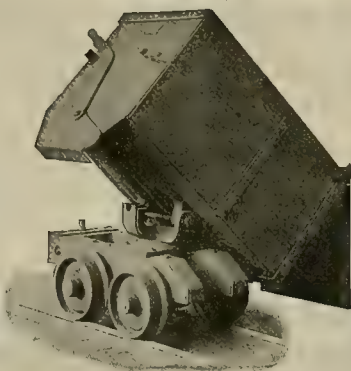
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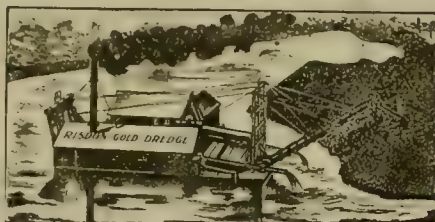
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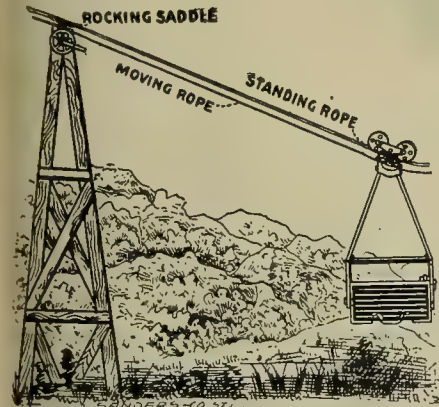
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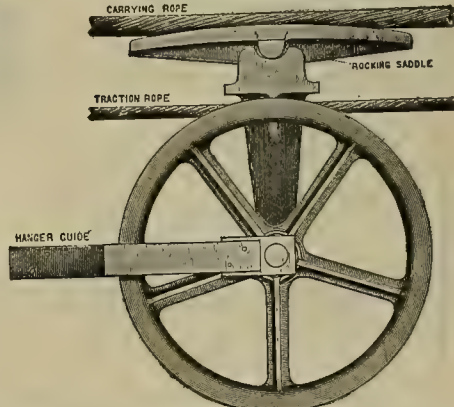
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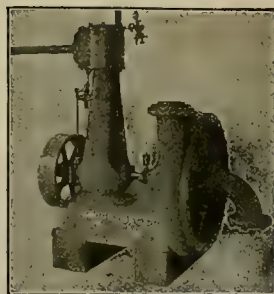
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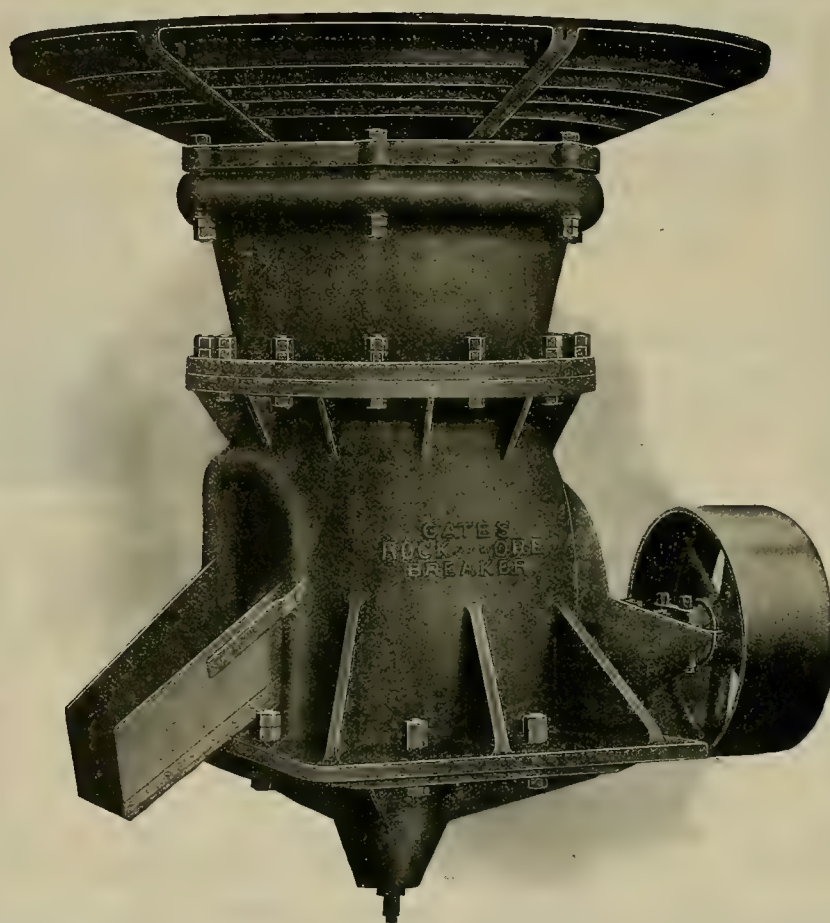
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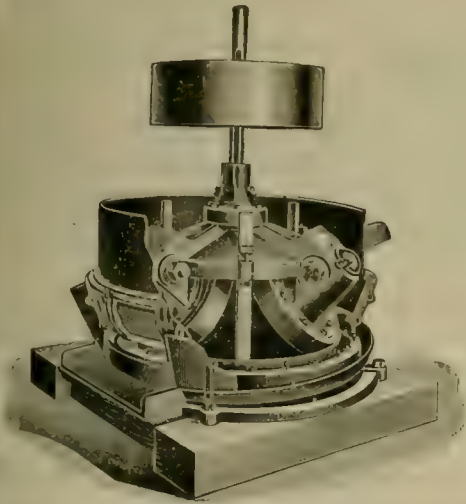
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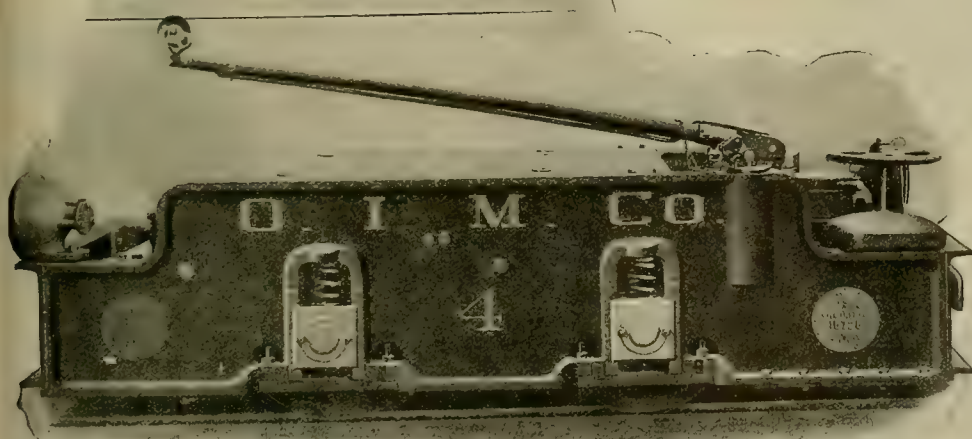
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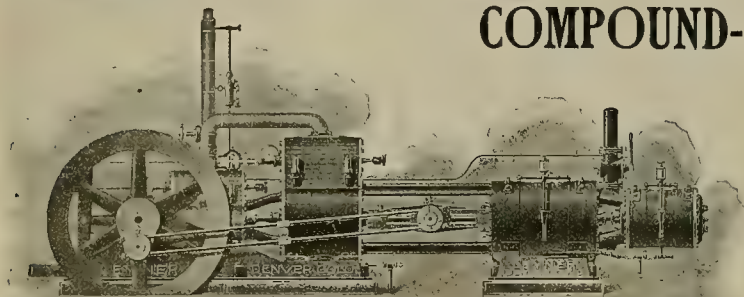
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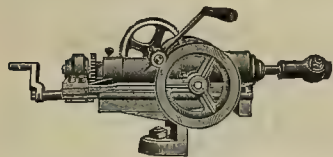
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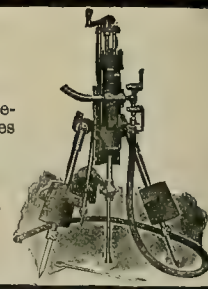
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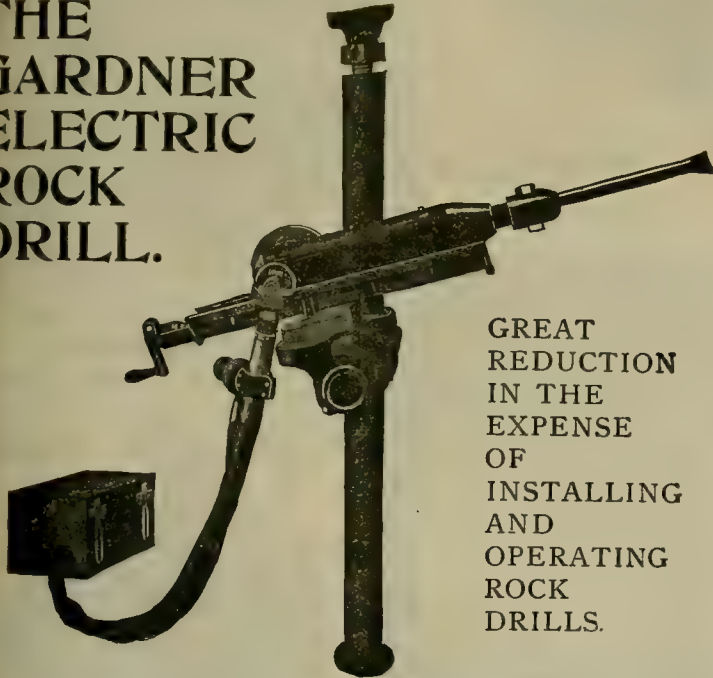
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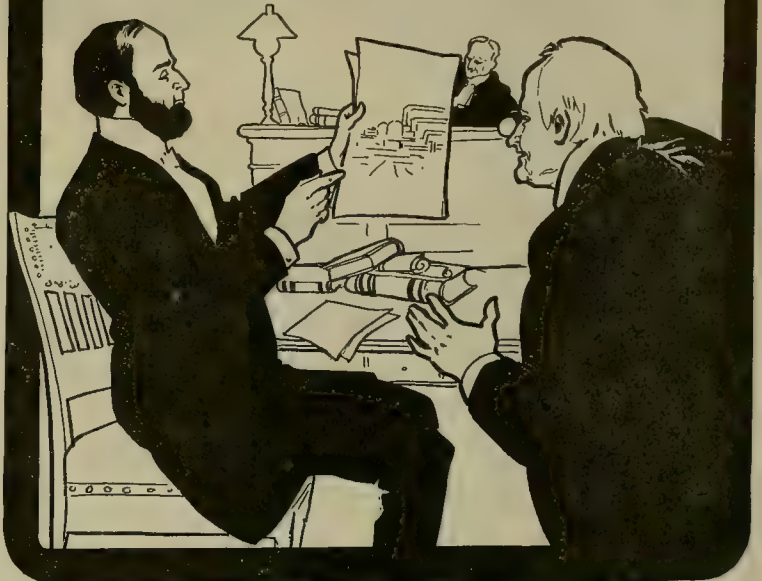
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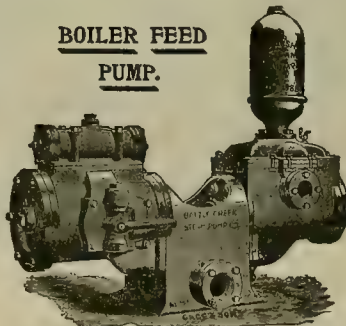
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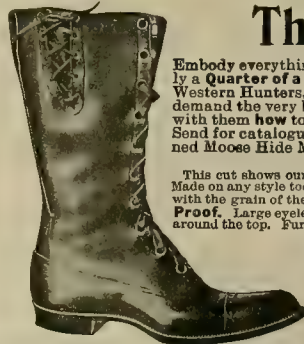


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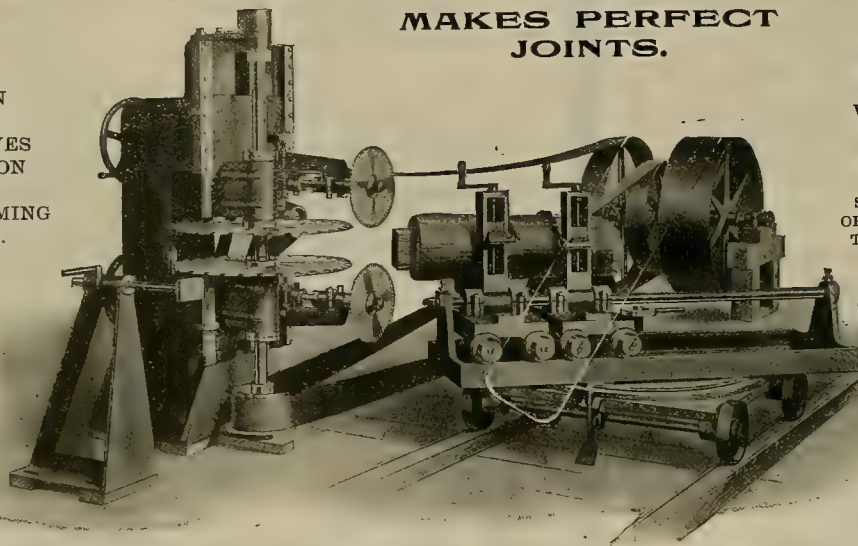




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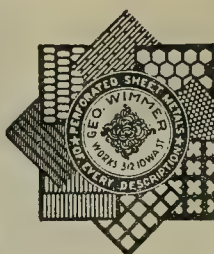


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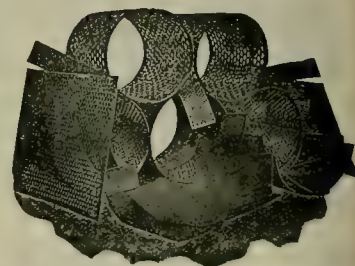
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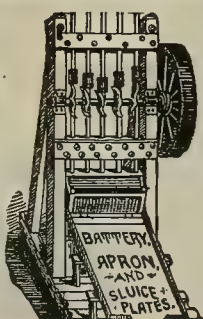
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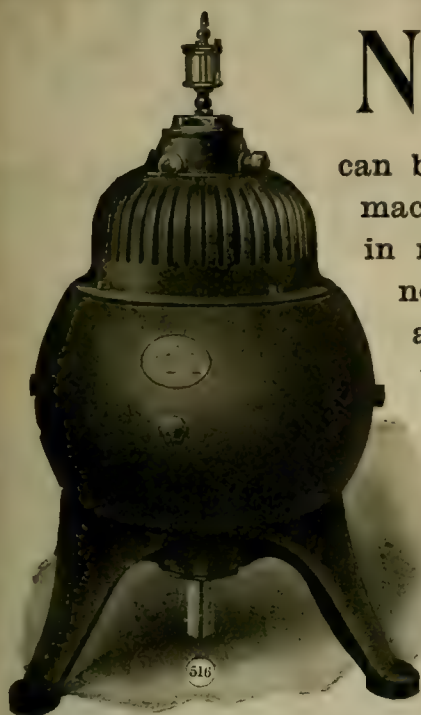


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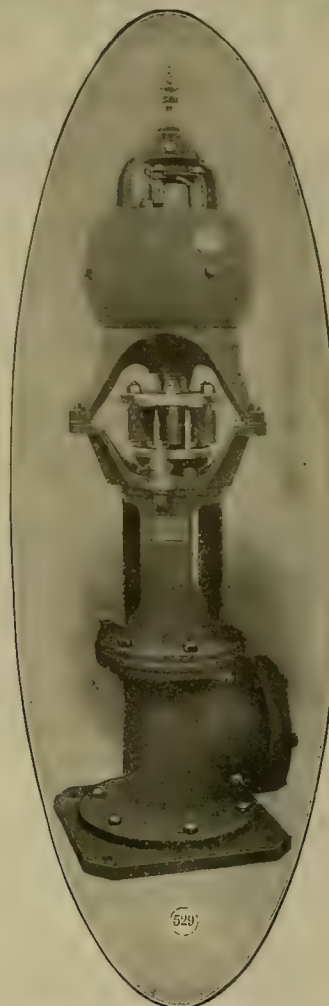
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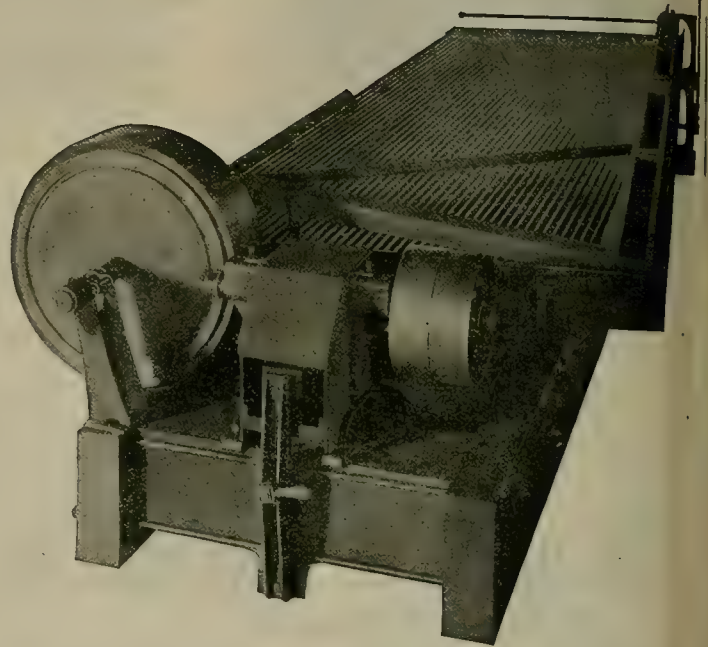
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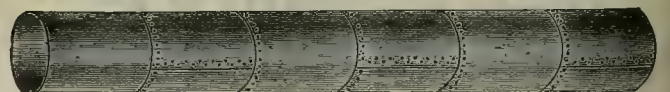
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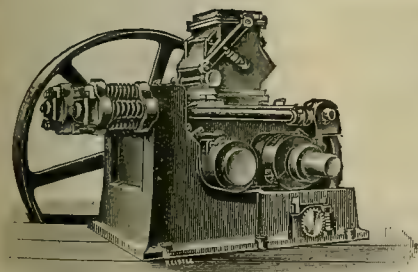
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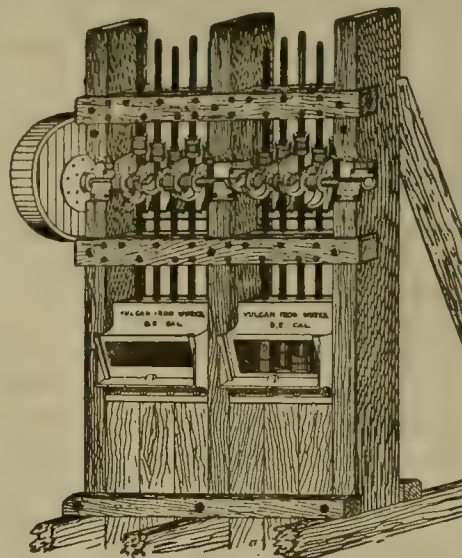
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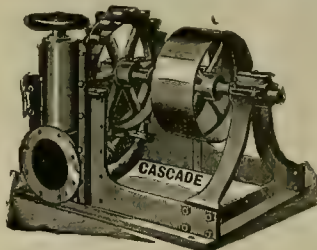
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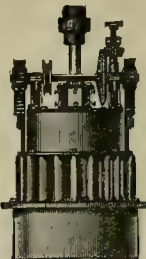
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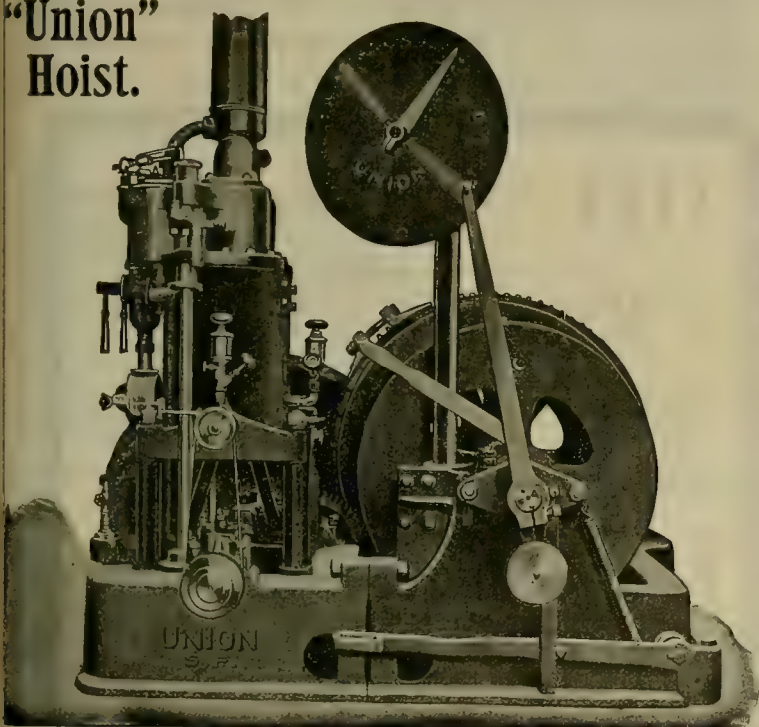
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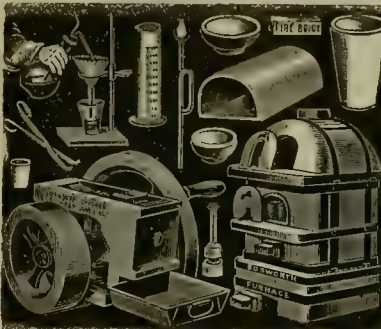
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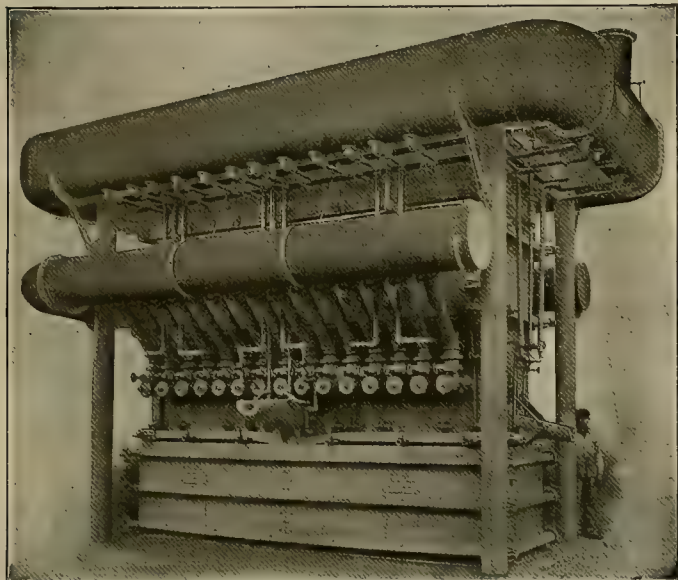
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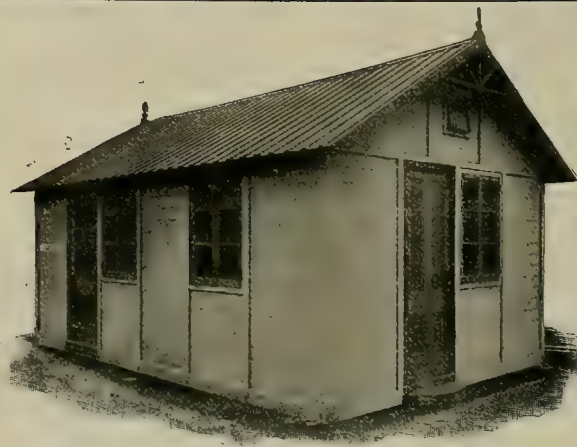
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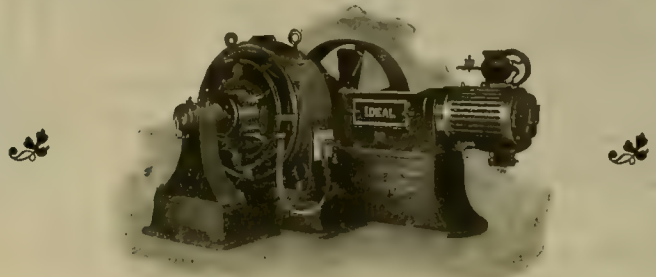
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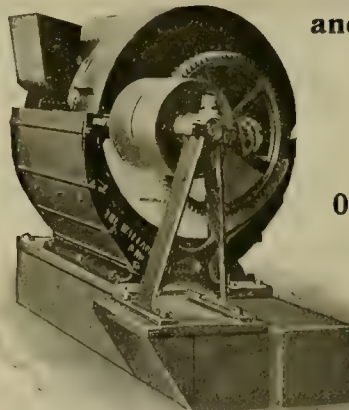
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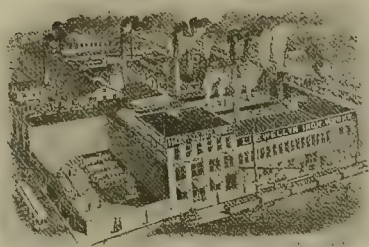
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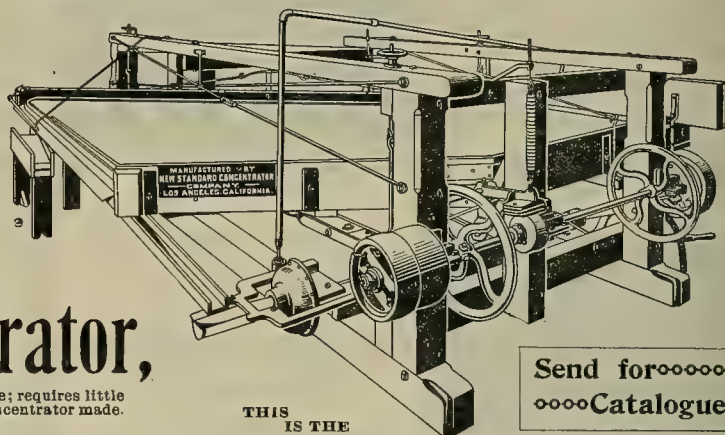
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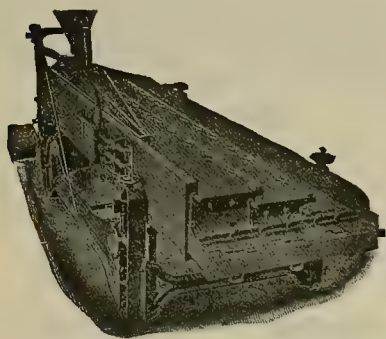


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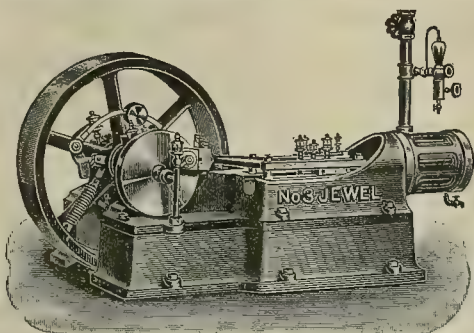
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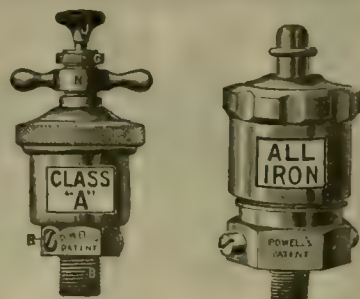
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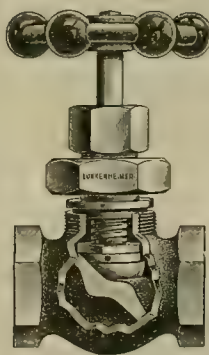


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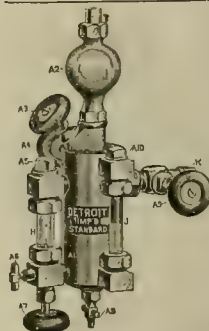
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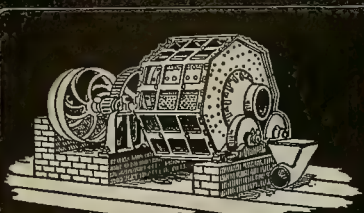
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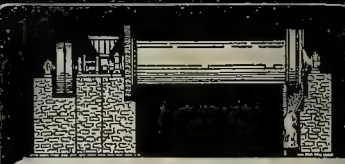
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L. S. Russell of Lansing, Mich., of the Bureau of Labor and Industrial Statistics of Michigan, has recently completed a tour of investigation of the Portland cement industry of his State. He is particularly enthusiastic over the Omega Portland Cement Company's plant at Jonesville, Michigan, which he terms "the really model factory, where everything is run on a perfect system."

"Cement," Sept. 1901.

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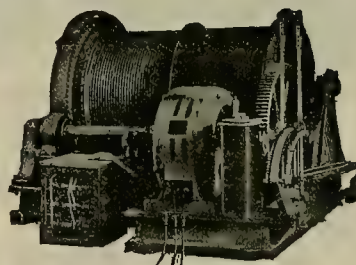
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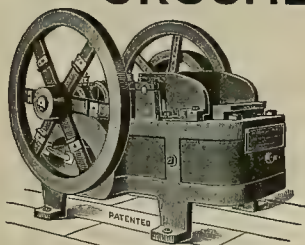
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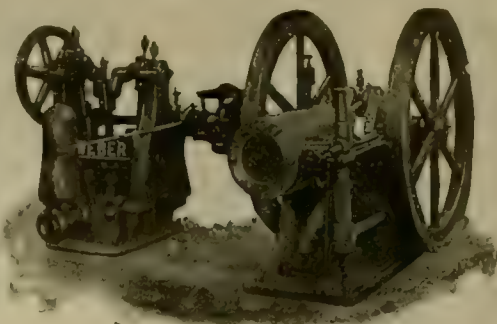




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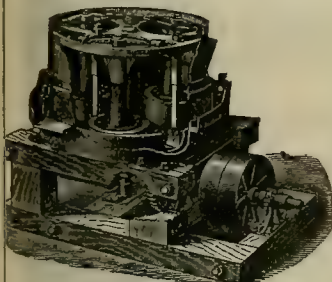
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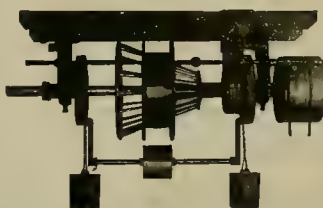
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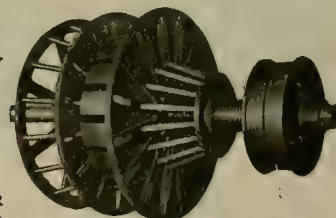


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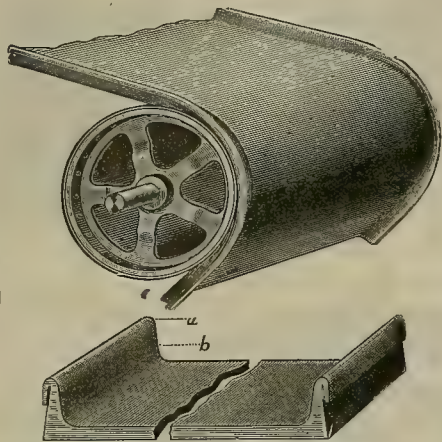
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THE EMPIRE MINES,  
GRASS VALLEY, NEVADA CO., CAL., Jan. 23, 1901.

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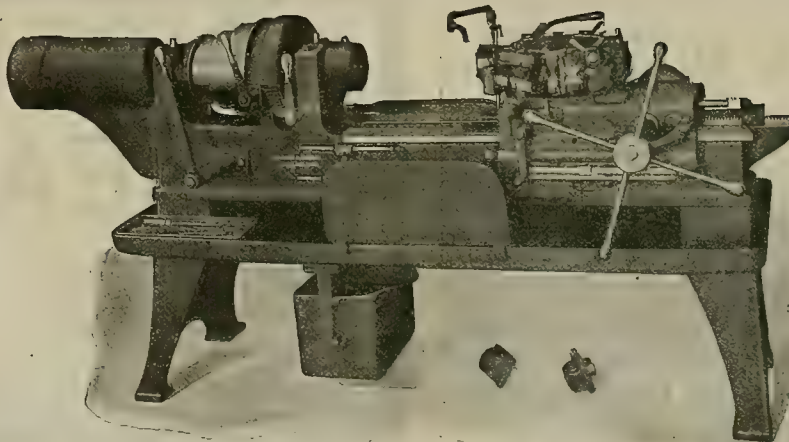
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Whole No. 2153.—VOLUME LXXXIII.  
Number 17.

SAN FRANCISCO, SATURDAY, OCTOBER 26, 1901.

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## Gold Mines in the Philippines.

From Washington comes a semi-official report in the shape of declarations made by army officers who have lately returned from the Philippines that, on the island of Mindanao, there are evidences of extended and rich placer deposits. The river Sita and its tributaries in the northern part of the island are said to be the region of the deposits and the gold obtained by the natives the basis of the statements of richness. American miners, it is stated, have not yet gone into the district, the Taft Commission governing the islands having no authority to issue permits or franchises.

Regarding this, it may be assumed that the trifle of lack of a permit is not holding back American miners if there are any in the Philippines that know of the existence of such placers as described. American miners have never been known anywhere in United States territory to wait for permits before working placers. If the reports are true there is placer ground enough for all the American miners now in the Philippines. Those who are there are western miners who have a rough and ready way of adjudicating rights without the costs and delays of court proceedings, so that the Taft Commission would never officially know of the mining. It may be assumed too that, while the Taft Commission has no authority to issue permits to mines, it has on the other hand no authority under which it can stop the mining on public land, or by American miners on lands bought from the natives who have title.

On the whole, the governmental condition described is distinctly favorable to the natural development of mining in the Philippines, and it is, if any-

thing, to be hoped that Congress will not be in any hurry to make mining laws for these islands. It would be better for Congress to send out a Commission to report on what the American miners are doing without any mining laws. Such an investigation

reporting conditions as they are would make their substantial recognition imperative in any subsequent legislation. The miners by that time would have the mines and the mining laws would only have to take into account the requirements under which the vested rights of appropriation could be changed into fee titles for the benefit of capital following the first exploitation by working miners.

Congress should move slowly in mining legislation for the Philippines. The conditions created at Nome as a result of ill-considered legislation should be an example of the effect of misfit legislation, which always proves worse than no legislation at all. California and the West generally got along very much better in mining during the first twenty years of its history before it had anything but the elastic miners' laws and customs than it has since under statutes, the meaning of the wording of which is still disputable and disputed.

Concerning the value of this report as to the richness of the placers, while largely circumstantial, it is not unreasonable that it should prove in substance true. The Philippine natives are not workers, and their work is limited by provision for a very short visual range of subsequent necessities to be satisfied. If Philippine miners get from 50 cents to \$3 gold a day with the pan or its equivalent, the placers will prove rich to American miners with even the simplest methods they employ. It seems fairly clear that the quantity of gold to be recovered in relation to the waste it must be separated from is large.



Copper Creek and Peacock Basin, Town of Helena, Seven Devils District, Idaho. (See page 172.)



Hoist and Cabins on South Peacock Mine, Seven Devils District, Idaho. (See page 172.)



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San Francisco, October 26, 1901.

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## California Miners' Association.

The tenth annual meeting of the California Miners' Association convened at Golden Gate Hall in San Francisco on the 21st inst. The number of accredited delegates exceeded that of any of the preceding conventions by forty.

The following county miners' associations and other organizations were represented by delegates as follows:

Nevada 170, Shasta 90, Placer 80, San Francisco 70, Calaveras 43, Amador 34, Butte 20, Alameda 20, Sierra 24, Yuba 14, Tuolumne 5, Plumas 5, Santa Clara 5, Kern 5, San Bernardino 5, Inyo 5, Fresno 5, Mariposa 5, Solano 5, Marin 5, San Luis Obispo 4, Southern California Branch 5, Southwest Miners' Association 5, Chamber of Commerce of San Francisco 5, Chamber of Commerce of Sacramento 5, California Petroleum Miners' Association 10, Pacific Coast Petroleum Miners' Association 5, California State Mining Bureau 5.

Governor Gage of California delivered an address and was followed by Mayor Phelan of San Francisco, who delivered an address welcoming the delegates to the city. In the course of his address he said:

Robert Louis Stevenson has described San Francisco as the smelting pot of the nation. We have accepted that description as most fitting.

You are here for business. One of the features which you are to discuss is the creation of a Department of Mining, under a cabinet minister, at Washington. It is proper that the mountains should be looked after by the Government. This new department would be of untold value to the State of California.

During the civil war the gold of California furnished the sinews of war to the United States Government, the means of preserving the national credit. Therefore the Government owes a sentimental debt to the State. As a mere matter of national policy it is necessary for the Government to preserve the mining interests of the country.

The following were announced as the Committee on Credentials: W. H. McClintock, Tuolumne county; C. H. Weatherwax, El Dorado county; S. J. Hendy, San Francisco; W. F. Englebright, Nevada county; A. G. Meyers, Siskiyou county; William Nicholls, Placer county; A. H. Ward, Mariposa county; J. M. Gleaves, California Petroleum Miners' Association; A. Ekman, Butte county; J. F. Parks, Amador county; A. R. Briggs, Fresno county; W. C. Ralston, Calaveras county; Joseph Durfee, Yuba county; A. W. Bishop, Alameda county; M. E. Dittmar, Shasta county; Frank R. Wehe, Sierra county; L. E. Aubury, Southwest Miners' Association; A. G. Lightner, Kern county; H. Z. Osborne, southern California.

As the meeting was about to take the noon adjournment, Delegate Lafa Pence called the attention of the convention to the option at \$25,000 held by the Debris Commission on the land of James O'Brien on Yuba river, and other options, requiring small sums, for parts of the necessary site for the restraining dam. It was a question, he stated, whether the options expired October 21st or 22nd, but to be on the safe side, he moved that a committee be ap-

pointed to solicit the necessary money to take up the options at once. After discussion, the motion carried. James O'Brien was called to the floor for a statement. He said that his objections to the dam were well known. He refused to extend the option for a few days, and on his refusal the committee, consisting of W. C. Ralston, A. Caminetti and Lafa Pence, was appointed and acted immediately.

On reassembling after the noon adjournment, President Voorhies announced that the committee reported that the money was raised. The donations to the fund totaled \$3150. The contributors were: North Bloomfield M. Co., \$500; California Powder Works, \$500; Eureka Lake M. & Water Co., \$250; Joshua Hendy Machine Works, \$100; Calaveras M., Water & Power Co., \$100; Miller, Sloss & Scott, \$200; Dunham, Carrigan & Hayden, \$200; Baker & Hamilton, \$200; Harron, Rickard & McCone, \$100; Henshaw, Bulkey & Co., \$100; John Roebing's Sons Co., \$100; MINING AND SCIENTIFIC PRESS, \$100; W. W. Montague & Co., \$100; A. Caminetti, \$100; William Nichols Jr., \$100; F. R. Wehe, \$100; J. M. Gleaves, \$100; W. C. Ralston, \$100; George Stone, \$100.

In the short time at the committee's disposal they were unable to see all who wished to contribute, and the amount necessary was so promptly furnished by those first seen that offers of contributions from San Francisco business houses and miners of double the sum collected were unavoidably declined, not being needed. The response to the subscription asked was prompt and generous, and equally creditable to those who missed the chance to contribute with those who contributed.

President Voorhies read his annual address, saying in part:

Gentlemen of the California Miners' Association: Ten years ago a number of hydraulic miners met in the city of Auburn, Placer county, to see if some means could not be devised whereby hydraulic mining might be resumed without material injury to the farming lands and navigable rivers of the State. The outgrowth of that meeting was the organization of the California Miners' Association, and this meeting to-day is the tenth annual convocation.

It is estimated that more than \$300,000,000 in gold is locked up in the gravel hills of Placer, Nevada and Sierra counties which could be liberated and put into circulation if some means could be devised to prevent injury to the adjacent lands.

The first step taken to aid the miners was by the State Legislature in making an appropriation of \$250,000, and the National Congress appropriated a like sum for the construction of barriers to restrain the debris already in the ravines and channels which feed navigable rivers, and also to permit the resumption of hydraulic mining under certain restrictions. The Federal engineers comprising the California Debris Commission made estimates of the cost of the work to be \$800,000. Our representatives in the State Legislature secured a further appropriation of \$150,000, and the National Government will undoubtedly appropriate a like sum—in all, \$800,000, to build barriers according to the plans of the Federal engineers, and preliminary work is now being done, such as securing the necessary land for the restraining barriers; but the engineers are having some difficulty in securing the land they deem necessary for that purpose. We trust, however, they may be able to overcome these difficulties and soon start the actual work of construction.

This Association has done everything in its power to aid in the passage of the so-called "Mineral Lands bill," which was before the last Congress, and received favorable reports from the committees; but, we are told, owing to lack of time, it died on the files, and will have to be re-introduced when the new Congress meets next December.

At our last annual session the Petroleum Miners' Association joined us in our deliberations, and have worked harmoniously with us during the past year for the passage of such laws as would be beneficial for that industry, which is now assuming great magnitude in this State, and is adding to its wealth.

The mineral productions of the United States are growing so very rapidly that the annual value is estimated at more than \$1,000,000,000. It is right and proper that the mining industry of the United States should have of the Government more protection and assistance, which could be better facilitated through a Cabinet department of the executive branch of the Government, and if those engaged in the different branches of mining throughout the United States will join hands and ask for the establishment of a Cabinet officer of Mines and Mining, we certainly ought to be successful in obtaining it.

I would suggest that a committee be appointed to revise the by-laws of the Association so that every member who contributed his annual dues to carry on this work could feel that he had a perfect right to come to San Francisco and participate in the work of the annual convention. The State membership of the Association is about 9000; the annual number of delegates elected to attend the State convention is about 500. I think the influence of a State meeting of 1000 or 2000 members would be far greater than a meeting of 400 or 500 chosen delegates.

During the year three meetings of the executive committee were held, at which business in relation to the additional appropriation was transacted. At the meeting held September 14, 1901, Mr. Power of Placer, Mr. Christy of Alameda and Mr. Davis of Amador were appointed a special committee to draft resolutions of respect on the death of our late President, William McKinley, and to report the same to the convention. I would recommend that we have these resolutions printed on a mourning page of our proceedings.

The increased demand made upon the State Mining Bureau, owing to the increase in the mineral production of the State, necessitates more liberal appropriations for its support and maintenance, and I would recommend that some action be taken toward the recommendation

of the passage of a law that would give it a permanent income to carry on the work of the bureau.

I wish to congratulate all of the officers and committeemen of the Association for the prompt and efficient manner in which they have attended to all their duties, and especially the secretary, who has all of the work to perform during the year. The members of the executive committee have been prompt, and nearly all attended the meetings of the committee.

The Association owes much to the press of San Francisco and throughout the entire State for the courtesies that have at all times been shown to the Association, also to the business men of San Francisco, who have always responded liberally when asked for financial aid to carry on the work.

The Union League Club of San Francisco is deserving of the thanks of the Association for its kindness in giving the executive committee the use of its rooms for committee meetings.

The Committee on Resolutions was appointed, as follows: W. C. Ralston, chairman; W. F. Englebright, Nevada county; E. A. Belcher, San Francisco; J. H. Tibbets, Shasta; W. A. Pritchard, Amador; Jacob H. Neff, Placer; Frank R. Wehe, Sierra; A. W. Bishop, Alameda; H. E. Pickett, El Dorado; A. Ekman, Butte; Joseph Durfee, Yuba; W. H. McClintock, Tuolumne; S. S. Taylor, Plumas; Thomas Derby, Santa Clara; A. G. Lightner, Kern; Frank Monaghan, San Bernardino; A. R. Briggs, Fresno; A. C. Holly, Solano; James Irving, Los Angeles Chamber of Commerce; Victor H. Woods, San Luis Obispo; John F. Boyd, Marin; A. G. Myers, Siskiyou; A. H. Ward, Mariposa; J. J. Gunn, Inyo; J. H. Harrington, Santa Barbara; L. E. Aubury, Southern California; H. Z. Osborne, Southwest Miners' Association; J. M. Gleaves, California Petroleum Mining Association; R. H. Herron, Los Angeles Chamber of Commerce; J. F. Parks, State Mining Bureau; A. C. Hinckson, Sacramento Chamber of Commerce; Thos. Ricord, San Francisco Chamber of Commerce; Craigie Sharp, State Board of Trade; John McMurry, Trinity; William Thomas, California Water & Forest Association; Colonel Heuer, California Debris Commission; J. S. McBride, Nevada.

Congressman L. N. Wood addressed the convention. Speaking briefly, he urged the importance of keeping one man in Congress who was strongly backed by his State and would be listened to seriously.

Lieutenant-Governor Neff, in the course of a short speech, said he knew nothing more important to the State than the impounding of debris and the resumption of hydraulic mining. He declared there should be a secretary of mining in the Cabinet.

President Jordan of Stanford University addressed the convention and explained the practical advantages of the college-trained miner. "It is no longer the man who starts at the bottom and works up," he said. "It is the man who starts at the top and works down."

Professor Christy of the University of California described his recent visits to the great mining schools of Europe and the East, and said that, thanks to the generosity of Mrs. Hearst, the State University would soon have a school of this character which would be a monument not only to Mrs. Hearst and the late Senator Hearst, but to the highest development of scientific mining in the twentieth century.

Judge Adams of El Dorado introduced a resolution relating to mineral lands, which was referred to the Committee on Resolutions.

On assembling on the morning of the second day, the 22nd inst., the report of the Committee on Mineral Lands was made by Chas. G. Yale, chairman. It was reported by the committee that little progress had been made in obtaining Government aid during the past year. The legislation which has been before Congress for seven years is now in no better shape, according to the committee, than it was a year ago. In this connection the committee said:

The legislation proposed by this Association does not design to take anything from the railroad companies which ever belonged to them. By it the companies would lose nothing, by reason of the fact that under the terms of their grants for every acre declared mineral they are entitled to another within the indemnity limits of their grants. But the California mineral lands are yearly becoming more valuable as the variety of our mineral products becomes recognized and more substances are commercially utilized. At one time and for many years our mineral products were mainly gold, silver and quicksilver. Now some forty-five substances are mined, quarried or otherwise obtained, and the number increases yearly, as well as the value of the total product. For the past eight years the value of the mineral product of California has advanced over \$2,000,000 each year, until it has now reached over \$32,000,000 annually. By reason of copper and oil developments alone, to speak nothing of the work in gold and other substances, the next four or five years should see a gradual increase of from \$3,000,000 to \$5,000,000, instead of \$2,000,000, each year.

Gradually, year by year, the domain opened to the prospector within the borders of our State has been narrowed. In his wanderings, he runs against ranches, farms, orchards, etc., the land of which is not for him, though surrounded by active mines. And, worst of all, are the great tracts of land held under railroad grants, extending from the deserts to the snows, and hundreds of thousands of acres in extent. The more land patented to them unclassified, the less of public domain is there for the prospector. Now, in asking what we do from Congress we are endeavoring to restore to the prospector what rightfully belongs to him and is wrongfully withheld. We know that by the provisions of the law estab-



lishing Federal grants to prospective railroad companies, the mineral lands were exempted therefrom and did not pass to the companies. The prospector knows this also, but is powerless to regain his rights, and it is our duty, as allied representatives of the mining industry, to regain them for him, and do it as promptly as may be. Good, active missionary work on the part of all the individual members of this Association is necessary to this matter. The mere passing of resolutions or memorials or appointment of committees, and letting the matter rest there, is of little effect, as experience has shown. Nor is there much effect in appointing a special committee, the members of which reside at different points in the State, and therefore seldom meet. The real, practical work is done in Washington, for from there must come relief, and from nowhere else.

The committee report was unanimously adopted and ordered transmitted to Congress by the Association.

The special committee on resolutions upon the death of President McKinley reported through Prof. S. B. Christy of the State University as follows:

Whereas, William McKinley, selected by the people, from the people, to be President of the United States, while extending the right hand of fellowship to the representatives of the American people, after a long career spent in the service of his country, has been stricken down by the coward hand of anarchy; therefore be it

Resolved, By the California State Miners' Association, that we mourn in William McKinley the type of American citizen that we all honor, the brave soldier, the tender and devoted husband, the generous and loyal friend, the public spirited citizen, the wise statesman. His broad sympathies with every section of our great country, his long and useful public life, his tragic end, his generous kindness and sublime faith in the face of death have made us forget differences of parties and creeds, and we stand by his grave united in our common loss; be it further

Resolved, That we wish to express with the entire civilized world our abhorrence of government by assassination as foreign to the spirit of our civilization, and as the mortal foe of all that makes for patriotism or progress; be it further

Resolved, That, recognizing in loyal citizenship the strongest safeguard against anarchy, we call upon every American to do his whole duty as a citizen, to create and maintain a quickened public sentiment which shall not only aid in the enactment of wise and just laws, but shall compel them to be respected and enforced. We most especially urge our courts to aid in such swift and certain administration of justice as shall command the respect and confidence of the people; be it further

Resolved, That we urge upon Congress to pass such immigration laws as, while enabling all honorable and worthy foreigners to become citizens, shall rigorously exclude from our country all who are unwilling to abide by its laws.

At the request of the chair the resolutions were unanimously adopted by a rising vote.

Secretary Benjamin's report reviewed the official acts of the Association during the past year, mentioned that steps had been taken toward forming branch organizations in Mariposa, Madera, Fresno, Kern, Lassen and Shasta counties. He reported receipts during the year as \$3516.50.

The treasurer's report showed a cash balance of \$2983.74. This was left from an original balance of \$2321.15, supplemented by receipts of \$3952.20 and reduced by a disbursement for the year of \$3289.61.

The report of the Committee on Legislation was read by John F. Davis of Amador, chairman of the committee. The committee made a number of recommendations, which were adopted, reiterating their statement as made at preceding conventions. These were referred to the Committee on Resolutions and appear there.

Dr. C. T. Deane, secretary of the California Oil Producers' Association, addressed the convention on the petroleum industry of the State.

Addresses were made by L. C. Aubury, S. M. Shortridge and Senator George C. Perkins.

The convention reassembled on the 23rd inst. for the third and concluding day.

A resolution was adopted recommending the reenactment of the Chinese Exclusion Act by Congress.

Congressman W. S. Wood addressed the convention, urging the drafting of any desired legislation immediately, so that it could be introduced at the meeting of Congress in December.

Congressman F. L. Coombs also addressed the convention.

The Committee on Resolutions, W. C. Ralston chairman, submitted its report as follows:

Resolved, That, in the judgment of this Association, the mining industry of this country, with its output of raw material amounting in 1900 to the sum of \$1,070,088.89 in value, its tremendous significance to the industrial prosperity of the nation and its still more splendid promise for the future, warrants and demands the governmental protection and assistance that can be adequately extended only through a cabinet department of the executive branch of the Government. We therefore heartily indorse the now national demand for a cabinet department of Mines and Mining.

Resolved, That the Committee on Legislation be requested to prepare a bill embodying the views of this convention on the proposition of having a Department of Mines and Mining, and that the same be submitted to the Executive Committee of this Association at its first meeting, so it can be immediately forwarded to our delegation in Washington.

Resolved, That we deem it the duty of this convention to place itself on record in favor of liberal encouragement and protection to all legitimate mining interests, and pledge ourselves to assist in every reasonable manner

any and all legislation, State or National, which is calculated to remedy existing wrongs. We recognize the gross injustice of permitting that class of land pirates which, by claiming land to be suitable for agricultural purposes that is manifestly and essentially unfit for any uses except mining, to attempt to wrest from purchasers of State lands their recognized equitable rights, and through perjury and distorted interpretation of the laws of the State to place serious obstacles in the way of large investments of money and important oil developments.

Resolved, That this Association again express its deep satisfaction at the justice of the policy and action of the Commissioner of the General Land Office, Binger Hermann, in his suspension from agricultural entry of a large area of probable oil lands in this State pending an impartial investigation of their mineral or non-mineral character, thereby preserving to the oil miners the mining rights which are theirs by both the letter and the spirit of the laws.

Resolved, That our Congressional delegation be and is hereby requested to use all honorable means to have enacted a law by which the location of petroleum placer claims might be so regulated as to secure to the locator the right to locate not to exceed 160 acres and give him an opportunity to make technical "discovery" of mineral as precedent to location. A measure of this nature is demanded by the peculiar conditions of the petroleum industry, and is necessary to give effect to the spirit and intent of the mining laws, and would be a wise adaptation to oil development of the tunnel site law and would work no injury to any legitimate industry.

Resolved, That in the problem of remedying the criminal abuses of the land and mining laws of the Nation by the wholesale attempts to secure as agricultural lands, by the use of so-called scrip and otherwise, great tracts of the public domain that are unquestionably mineral in character and which are recognized as mineral by the people who seek to secure them as such by subterfuge, legal technicalities and outright perjury, the petroleum industry faces the matter of most serious present concern to it in its relation to the Federal laws and their administration. We believe that this problem is peculiarly one in which the whole mining industry of the State is interested, together with the petroleum miners, and we solemnly pledge our highest endeavors to protect the heritage of the miner in the public domain in accordance with the letter and spirit of the beneficent laws which were intended by Congress sacredly to preserve the vast mineral resources of the public domain to the mining industry that their development might be encouraged and fostered. We distinctly favor the proposition that where a contest takes place between a scripper and a miner in any department of the United States Land Office, the burden of proof shall be placed upon the scripper and not on the miner.

Resolved, That we look forward with pardonable pride to the early construction, already assured, of the restraining barriers for which \$650,000 has been appropriated by our State and national Governments. We heartily approve the plans and recommendations of the California Debris Commission for the construction of such restraining barriers as outlined in their official report of 1899 to the Secretary of War, and we hereby request our delegates in Congress to use all honorable means to secure such added national legislation and appropriation as may be necessary to carry such work to a final and successful completion; and be it further

Resolved, That we favor the construction at the earliest possible date of additional restraining dams and barriers upon the tributaries of the Sacramento and San Joaquin rivers and their branches, to the end that hydraulic mining may be resumed in all parts of the State adapted thereto.

Whereas, There is an absolute, urgent and immediate necessity for the segregation of the mineral lands within the railroad land grants of the State of California in order that such mineral lands may be restored to the public domain and thus made available to the mining prospector. These mineral lands were especially excepted from the railroad land grants and have never been granted by the United States Government to any railroad company, and were intended to be specifically preserved as a part of the public domain, open to exploration and purchase under the Federal mining laws. The task of securing a proper and effective classification and segregation of the mineral lands within the railroad land grants in California was undertaken several years since by the California delegation in Congress, through the suggestion and co-operation of the California Miners' Association, but the efforts thus made have been so far unavailing. It is now believed, however, that a more opportune time has arrived for the accomplishment of this desirable work; and, therefore, be it

Resolved, That our committee upon mineral lands be instructed to use all honorable means at its disposal to secure such legislation at the hands of our National Congress as will bring about the desired results, and we furthermore request our Senators and Representatives in Congress to urge upon the Congress at its ensuing session, commencing in December next, to enact such legislation as will promptly, effectually and finally classify and segregate the mineral lands within the railroad land grants of California, to the end that such mineral lands may be again thrown open to exploration and purchase in the same manner as are the other mineral lands of the United States under the Federal mining laws regulating such exploration and purchase. And we further recommend that, if deemed necessary, and with the advice of the executive committee of the Association, that a personal representative be sent to Washington to represent the interests of the miners of California in this matter.

Whereas, Opposition to the efforts of certain of our fellow miners to operate their hydraulic mines under the Caminetti law has been made in the courts of the State and more suits of a similar character are threatened; and, whereas, while the injunctions obtained in the cases already brought under a ruling of the court that the licenses in these particular cases were not regularly issued, the constitutionality of the law has been challenged; now, therefore, be it

Resolved, That the executive committee of the California Miners' Association shall determine the constitutionality of said law in the courts of last resort by defending a test case brought against a miner holding a regularly issued license by the California Debris Commission.

Whereas, Complaints have been made to this Association that certain parties, for the purpose of fraudulently procuring title to mineral lands, in many cases where mining claims are situated thereon, make and file lieu, forest reserve and other scrip, and procure persons to make false non-mineral affidavits to be filed with and to complete such fraudulent entries; and, whereas, miners holding such mining locations are often unable to contest such fraudulent locations; therefore, be it

Resolved, That he or they may lay such facts, with the names of his or their witnesses, before the secretary of this Association, whose duty it shall be to lay the names before the Federal Grand Jury for the purpose of having the maker of such false non-mineral affidavits prosecuted for perjury and such locators for subordination of perjury.

Resolved, That we recognize the fact that the future development of the State depends in a large measure upon the future development of its water resources and the preservation of its forests; therefore, we favor the immediate and thorough investigation of, and report on, our water resources, and the best methods of improving and developing the same; the collaboration of the Federal and State Governments in such investigations; and the proper appropriations therefor by our State Legislature. We desire and urge upon the Federal Government that all public forests be reserved from sale, and the establishment of a forest patrol, and we favor the enactment by the State Legislature of such penal laws as will lessen the danger from forest fires.

Resolved, That we heartily favor the amendment of Sections 2319, 2320 and 2324 of the Revised Statutes of the United States, concerning the location of mining claims, so that the locator shall be accorded a reasonable and definite time within which finally to mark his surface boundaries on the ground, so that all local rules, regulations and customs of miners and all State and Territorial law on the location of mining claims shall be abolished, and so that, while liberal provision shall be made for the protection of the locator who holds and works his claim in good faith, the law concerning annual assessment shall most effectually check the present injurious practice of holding mining claims year after year without development. Be it further

Resolved, That we recognize the importance of the passage of such amendatory legislation and urge the necessity of action upon our Committee on Legislation and the California representatives in our National Congress.

Whereas, The great mineral wealth of the State is increasing from year to year and greater demands are made upon the State Mining Bureau, therefore be it

Resolved, By this convention that we earnestly request our legislators to be liberal in their appropriation for the support of this bureau.

Resolved, That the California Miners' Association, in convention assembled, does hereby indorse the present administration of the State Mining Bureau, and commends State Mineralogist Lewis E. Aubury for the active manner in which he is promoting the mining interests of California.

Whereas, The California Club, composed of a large number of patriotic women of this State, is using its utmost efforts to preserve the Calaveras grove of big trees to the people of the United States, and without which efforts the vandal hand of sordid commercialism would have destroyed said big trees; now, therefore, be it

Resolved, That this convention indorses the efforts of said club and will do all in its power to promote such legislation, either State or national, as will accomplish the object sought.

Whereas, The Chinese Exclusion Act, so called, is about to expire; and, whereas, upon its expiration, unless Congress shall enact another law of similar purview, this country, and particularly the Pacific States and Territories, will at once be flooded with Chinese; and, whereas the Chinese race has been proved to be wholly unassimilable with the Caucasian; and, whereas, the Chinese civilization in our midst has been proved to be wholly alien to ours and our institutions, and the presence of the Chinese among us to be a blight and a curse upon our people; and, whereas, we cannot but look forward with dismay and alarm to that untoward event which shall precipitate upon our shores the alien hordes of Asia without let or hindrance; therefore, be it

Resolved, That we hereby request our delegation in Congress to endeavor to procure the enactment of another Chinese Exclusion Act; and that we further hereby request our said delegation, in the prosecution of its efforts in this behalf, to exercise the greatest diligence and vigilance.

Resolved, That this Association holds itself greatly indebted to the public press of San Francisco and the mining counties for the assistance it has given, not only to the Association, but to the mining industry of California during the past year.

The report was adopted unanimously.

The Association concluded its meeting with the election of officers for the ensuing year. The officers elected are: President, E. C. Voorheis of Amador county; first vice-president, Frederick Zeiler of Nevada county; second vice-president, Lewis E. Aubury of Los Angeles county; third vice-president, M. E. Dittmar of Shasta county; secretary, E. H. Benjamin of San Francisco; treasurer, S. J. Hendy of San Francisco. They constituted the old board of officers and were re-elected, with the addition of M. E. Dittmar, who occupies the office of third vice-president, which was created by amendment of the by-laws of the Association, so that the northern counties, about to form a Miners' Association of Northern California, might receive a proper recognition in the State body.



## Seven Devils Copper Mines, Idaho.\*

The Seven Devils mining district is situated in Idaho county, Idaho, and includes a portion of the mountain range which extends along the right bank of the Snake river, between the mouths of the Weiser and Salmon rivers. On the west side of the range only short, unimportant torrential streams drain from the high summits directly into the Snake river. On the east side of the range the Weiser river, flowing south, and the Little Salmon and main Salmon rivers, flowing north, isolate the range from the other mountains of Idaho, except by the relatively low divide, midway of the range, separating the drainage basins of the Salmon river and of Weiser river.

That copper existed in these mountains was known many years ago, and all but forgotten, until about three years since, when the rising price of copper and the extent and richness of the Seven Devils deposits started their exploitation coincident with announcements that tended to create the idea that the discovery was a new one. The mines are high up among the summits of the range. Even with the navigable Snake river at the western base of the mountains in air lines from 3 to 15 miles distant from the mines, it is available for very few of them for transportation service. The most practicable route of transportation has been found on the east side of the range, past the divide at the head of the Weiser river, and by the valley of that stream to the city of Weiser, on Snake river, and the O. R. & N. Railroad. From Weiser northward the P. & I. N. Railroad has

daily. On the Decorah the lower tunnel is in 570 feet; a second tunnel, 150 feet higher, is in 360 feet. Above this is an upper tunnel, in about 170 feet, which is being mined out into an open cut or quarry by the removal of ore, to prepare a site for the sinking of a shaft. The diamond drill has been freely used in prospecting to prove and measure values in the ground in advance.

The ore is of excellent average grade and much of it already taken out is of high grade. From the Peacock mine fourteen cars of ore sold in Salt Lake City, Utah, netted, smelter and railroad charges deducted, \$1300 a car.

From the South Peacock two cars of sorted ore shipped went 72.5% copper. From the Helena ten cars of ore were shipped which netted \$17,000. The company consider that, with their present depth of development from what they regard as their proved ore bodies, they could ship 400 tons a day for a year. L. W. Hall of Weiser is president of the company and W. B. Hancock manager at the mines.

We are indebted for the illustrations to the courtesy of R. E. Lockwood, proprietor of the Weiser, Idaho, Signal.

### Rapid Shaft and Tunnel Work.

The actual work on the shaft and tunnel at the L. I. & S. Co., Stony Point, N. Y., for which Schroeder & Bartl were the contractors, was commenced on May 1, 1901. On May 20 it had been carried to a depth of 35 feet in the east shaft, and on May 26 the west shaft had reached a depth of 37 feet. This was through soft material and it was necessary to use 10x10 timber cribbing. At the depths given rocks

as fine a color as the best aluminum. It is not so hard and short as a 33% zinc alloy, nor quite so strong, but has supplanted it for most purposes because of its better working qualities and greater reliability under shock. It is at present in use for scale beams, surveying and astronomical instruments, light machine parts, gear wheels cut for blanks, cash registers, calculating machines, testing machines, indicator drums, surgical appliances, cases and parts of pneumatic tools, etc. It is non-magnetic, and therefore particularly useful in scientific instruments.

### Mining Laws of Mexico.

Permission must be obtained from the Government in Mexico before prospecting. This permission can be obtained from the nearest mining agency for a fee of \$3 if it is Government land, and the permit designates the land and gives ninety days exclusive rights of prospecting. As much as 1550 acres can be included in one permit. Where the land is in private ownership permission must first be obtained from the owner. If the latter refuses permission an appeal can be made to the mining agent, who has authority to grant the permission. On the expiration of the ninety days on Government land the right of denouncement, the equivalent of our location, is open for six months, after which, if there is no denouncement, the land is again open for exploration under a permit obtained as described.

What is called the denouncement is filed with the local mining agent, together with a fee of about \$30. The agent publishes the denouncement three times, and appoints a Government surveyor to survey the



Quarrying Ore From Open Cut, Decorah Mine, Seven Devils District, Idaho.



Upper Tunnel, Helena Mine, Seven Devils District, Idaho.

been constructed 60 miles to Council, leaving 45 miles yet to be built to get the road to Landore, its terminus for the Seven Devils mines.

Among a notably large number of copper properties in the district that the development work of the last three years has demonstrated to be valuable mines, the Boston & Seven Devils Copper Co. have the one, some views of which are herewith illustrated. The property comprises some twenty-five claims, all prospected, and four—the Peacock, South Peacock, Helena and Decorah—well developed and in productive operation. In addition to the mines, the company has in construction near Weiser a smelting plant of 180 tons daily capacity, with provision made for its ultimate enlargement to a capacity of 2000 tons daily. Some of the principal stockholders are among the principal people interested in the railroad now building toward the mines, so that the essential elements in the business are closely allied.

Pending the early completion of the smelter and the interval of a year that it is estimated must yet elapse before the railroad can be completed to Landore, the company is hauling ore by wagon in summer and by sled in winter to Council, and claims now to have over 10,000 tons piled up there ready for the smelter when it blows in. More ore is being stored in bins at Landore, and the company's plans provide for building a gravity train from the Peacock and South Peacock mines to Landore.

On the Peacock mine a double-compartment shaft has been sunk 175 feet, and a tunnel is in 420 feet, connecting with the tunnel. Through these openings about 1000 tons of ore are being taken out daily. On the South Peacock there is a shaft down 360 feet, with stations and levels at each 100-foot point. At the bottom of this shaft a diamond drill bore is being made on the dip of the vein to explore it in depth. This mine, it is considered, can output about seventy tons daily.

On the Helena mine there are two tunnels, one 160 feet in, and the other, 170 feet lower, is in 430 feet. This mine, as now opened, can produce fifty tons

were reached and blasting was commenced, using hand drilling. The shafts were sunk 15 feet by hand and on June 1 air was started through 3-inch pipe, and on July 20 both shafts were finished, the east one being carried down 60 feet below the cribbing and the west one 54 feet.

The tunnel was then started and driven 387½ feet, making a total distance in shafts and tunnel of 500 feet, driven in forty-eight days. After finishing the rock work the tunnel was lined with brick and concreted between the brick wall and the rock. The shafts were finished in the same way. In the air drill work two Ingersoll-Sergeant "D" drills were used in each face or heading. There were about 300,000 bricks and 1100 yards of concrete used, the latter being machine mixed.

The work was completed September 14. The location of both shafts is about 50 feet south of the Lake Erie shore.

The alloy of three parts of aluminum to one part of zinc is the most generally useful of all the aluminum-zinc alloys. It has a tensile strength of 35,000 pounds per square inch and an elastic limit nearly the same, with slight elongation before breaking. It is therefore not a malleable alloy, but yet it is not brittle, for it bends slightly before breaking. This quality is a valuable one, for it enables one to straighten out a casting to a certain extent under the hammer. Remarkably clean and sharp castings can be made with it, when experience has been attained with the proper gating of the mould and the exact temperature of casting. As with all these alloys, overheating in the crucible must be scrupulously avoided, as well as the use of iron stirring implements, since oxide or dross does not separate out of the metals easily, and may thus get poured into the mould and injure the casting. Its specific gravity is 3.4, and the contraction taking place during alloying is therefore 14%, which indicates a close and intimate combination. This alloy, when properly made from the pure metals, is all that can be desired in its working qualities, being equal to the finest brass in the lathe, under the drill, and in not clogging the file. It casts sound, takes a polish and has

tract. One pertenencia, which is is about 2½ acres, or any number of pertenencias can be denounced at one time for the same fee of \$30. Within sixty days from the filing the surveyor must make the survey and return it to the agent within sixty days from his acceptance of the appointment to survey. The surveyor's fees amount to from \$25 to \$100, according to the area and the terms made with the claimant. On making the survey the claimant can reduce his claim if he chooses. Monuments are placed marking out the ground. The return of the surveyor and the other papers in the denouncement are sent by the mining agent to the Department of Encouragement within sixty days after depositing the plans of the survey with the agent. They are sent back for errors and protests can be made to the agent before the plans are forwarded, in which case a notice is posted to bring the parties together.

If the plans are approved a stamp tax of \$10 (Mexican) must be paid, a pertenencia and the title papers are then signed by the President of the Republic and delivered to the denouncer within a few weeks after the payment for the stamps. The title papers go then to the Finance Department and are recorded, and an annual tax of \$10 a pertenencia can be paid in full in advance or in advance for four months at a time. A delay in payment for a month adds 50% to the tax, a delay of two months doubles it, and a delay of three months works an absolute forfeiture and opens the ground to denouncement again regardless of the improvements and expenditures made. It is illegal to work a mine for profit and to export ore until the title has been granted. Little attention is paid to this, however, and prospectors have at times shipped thousands of tons before receiving title.

The restrictions thrown around incorporated companies are rather more onerous than around individuals. Copies of incorporation papers and by-laws must be filed after translation into Spanish. A deed is then made to the company. Other papers must then be signed and the company appoint a local agent. Many of the details are small but conforming with them is essential. A violation would result in litigation.

\* See illustrations on front page.



## Subaqueous Tunnel Siphons in Boston, Mass.\*

By W. W. CUMMINGS.

The first shaft was sunk on the Everett side of the Malden bridge, as near the abutment as the retaining wall would allow. After going about 6 feet the steel caisson was erected and sunk in the ordinary way (Fig. 1), paving stones being placed on the shelf

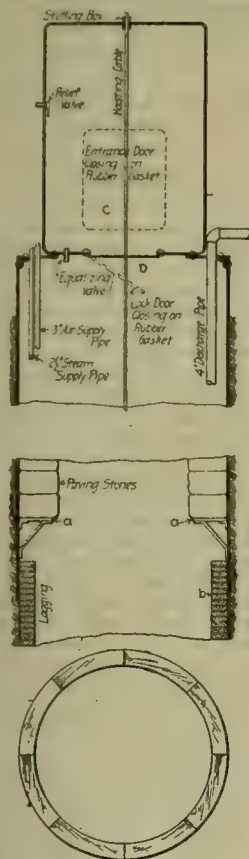


FIG. 1.—STEEL CAISSON AND SEGMENTAL LAGGING USED IN SINKING SHAFT OF MALDEN SIPHON TUNNEL, AT BOSTON, MASS.

at a and the excavation carried on under the cutting edge b. The casing was kept plumb by varying the excavation and also by such guides as might be used at the top. The caisson was extended by removing

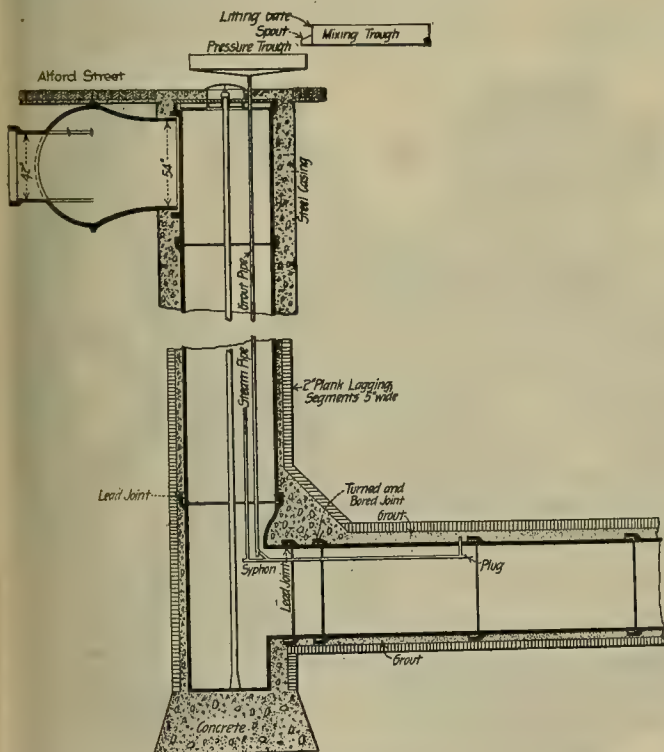


FIG. 2.—SHAFT AND SHORT SECTION OF CHARLESTOWN SIPHON TUNNEL, SHOWING METHOD OF GROUTING CAST-IRON PIPE IN PLACE.

the air lock and inserting a 10-foot section, calking the flanged joints when necessary. This shaft was 46 feet deep, 43 feet below high water, at which times, of course, the air pressure was about 23 pounds.

The steel casing was made of  $\frac{3}{4}$ -inch boiler plates,

\* Condensed from a paper read before the Boston Society of Civil Engineers.

riveted to a 3-inch angle iron, which, with the corresponding angle iron of the next section, formed a flanged joint that was made up with red lead and calked where necessary. The inner diameter of the tubing was 7 feet and the length of a section was generally 10 feet, each section weighing about 4000 pounds.

The cutting edge was made on the first section by placing a wide flange about 2 feet back from the bottom and staying it with brackets, as shown at a. On this shelf the paving stones were placed, to balance the upward pressure of the air and to furnish a downward thrust at the cutting edge. Stones, piles, sunken timbers, etc., were broken up and taken out through the lock. When material sufficiently compact to prevent the escape of the air was reached the sinking of the caisson was stopped, and the lagging was carried down the shelf, as shown in Fig. 1.

This lagging consisted of circular segments 6 inches wide, sawed from 2-inch plank and having an outer diameter of 7 feet. There were eight of these segments to a ring, and they were placed by spiking to the previous work with 7-inch spikes, each ring breaking joints with the previous one. This construction, which was the same as that used in the tunnel proper, was found to be exceedingly rigid.

A few feet above the point where the tunnel was to be started the tubular form was changed and the "goose neck" was started. This consisted in constantly lengthening that diameter of the shaft parallel to the axis of the tunnel, on the side from which it was to start, until room enough was obtained to turn a 54-inch pipe, 8 feet long, into the tunnel. In this "goose neck" the sides were necessarily flat, but, being surrounded by stiff clay at this shaft, they showed no sign of weakness. At the Charlestown tunnel, however, the material was sandy and the side came in.

The shaft was driven 6 feet below what was to be the bottom of the tunnel, and 4 feet of concrete was put in as a foundation of the pipe that was to make

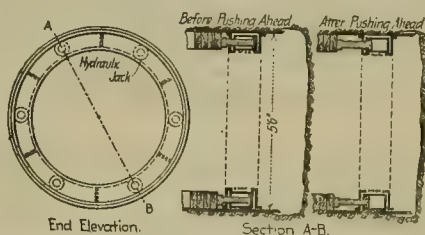


FIG. 3.—SHIELD FOR DRIVING MALDEN SIPHON TUNNEL WITH SEGMENTAL WOOD LINING.

lagging. This served a double purpose, pushing the shield forward and closing up the joints in the lagging, although, as the lumber was thoroughly dry when placed, it was found that the swelling of the wood made very tight work. The lagging was given a wash of cement after it was placed, and such leaks as showed were calked with wooden wedges and yarn, and by feeding dry cement into the holes the escaping air under pressure carried the cement with it.

North of the draw the tunnel ran beneath an ice guard, and the bottom of the piles had to be cut off in the heading. This occasioned no great hardships, while the driving was in clay, but about three-quarters of the way across the river a streak of silt and sand was struck, which, being only 7 feet thick between the top of the tunnel and the bottom of the river, followed the piles into the heading and stopped the work.

Poling planks were driven ahead, similar to those shown in Fig. 4, and cut so that the ends could be worked back on the cutting edge of the shield. Gunny sacks, filled with horse manure, sawdust, etc., were thrust into the cavities and, as soon as the holes were plugged, they were quickly plastered with clay. The material ahead was then excavated and the shield pushed forward. The surrounding material was so soft and unstable that the lateral movement of the shield was scarcely controllable, the whole structure moving toward the side that caved in.

As a whole, however, after the soft material was passed and the transit line extended, the headings met within 0.42 inch. The tunnel was allowed to fill with water and to remain filled for a few days to give the woodwork a chance to swell and to permit the silt to pack about the lagging.

To a great extent this closed the remaining leaks, so that a 3-inch pulsometer easily kept the water down after the air pressure was removed. After pumping the tunnel out a cross-section was taken and this, compared with the one taken before, showed that the tunnel had flattened about  $\frac{1}{4}$  inch, thus proving that the lagging would not be permanent of itself.

In giving the line of the tunnel the distance between the shafts was triangulated and the direction transferred to the tunnel by means of two wires which passed through holes tapped in the air lock. This gave a base line about 4 feet long, which was produced into the heading by means of nails in the roof of the tunnel.

In this tunnel it was decided to lay pipe 54 inches in diameter, 8 feet long, with turned and bored joints. The pipes were lowered into the shaft on the Boston side of the tunnel, turned on a pair of skids in the "goose neck," and drawn through by an engine at

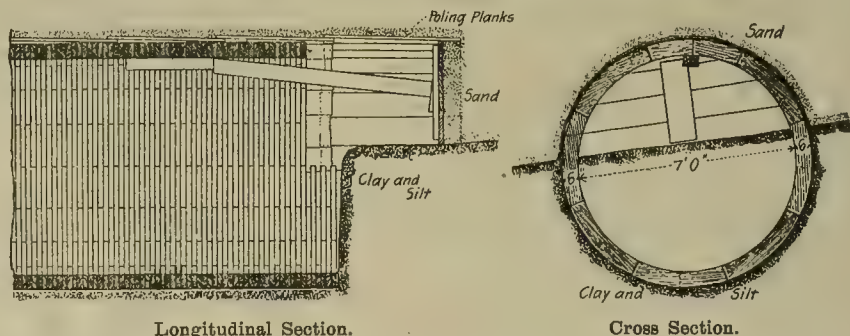


FIG. 4.—SKETCH SHOWING POLING-BOARD METHOD OF DRIVING MALDEN SIPHON TUNNEL.

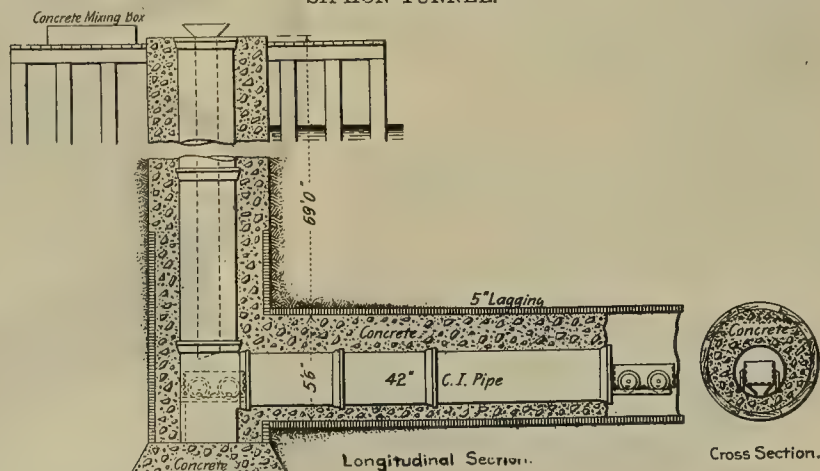


FIG. 5.—SECTION SHOWING METHOD OF CONCRETING CAST-IRON PIPE, CHARLESTOWN SIPHON TUNNEL.

the leg of the siphon. (Fig. 2.) The shaft on the Boston side was then sunk in the same way, and the tunnel started from that end.

In driving the tunnel a shield was used similar to the Greathead design, as shown by Fig. 3. The excavation was carried about 2 feet ahead of the shield in good digging, and the latter was pressed forward by the hydraulic jacks a, a, bearing directly against the

the other shaft. A piece of timber was fastened to the tunnel, and the joints were forced home by a hydraulic jack which rested against it.

Between the pipe and the lagging was a space varying from nothing, where the lagging was cut out to improve the alignment, to 6 inches at a point diametrically opposite. This space it was proposed to fill with grout under pressure. The engineers made



a series of experiments as to the action of different cements and mixtures under conditions similar to those on the work. In each case grout was made and poured into a pan containing salt water. All the cements to which lime had been added remained like so much mud; some of the cements with high records caked like dirt, while some of the cheaper, low-grade cements took a quick initial set, which, of course, was what was wanted in this case. It was found that one brand of cement, into which steam was turned, became soft and slippery like paste and set very quickly. A jet of steam, acting on the principle of an injector, was accordingly used, the grout being mixed in a trough at the top of the shaft and carried down by 1½-inch pipes. (Fig. 2.) In laying the 54-inch pipes bulkheads had been built between the pipe and the lagging every 25 feet or more. Each length of this pipe had a hole for a ½-inch pipe tapped in its top, and into these holes the grouting pipes were successively introduced, the progress of the grouting being watched through the holes in the succeeding pipes, and these holes being plugged when the grout began to appear.

The steam jet was in the shaft, and as the reach from it to the introducing hole became greater and the time changing forward became longer, the injector became plugged with cement and was finally abandoned, the pressure due to the height of the mixing trough being used and the pipe washed out with clean water after each succeeding run. When the distance became too great to get the desired pressure by this method, the grout was mixed in the tunnel and injected by means of a force pump.

From time to time the plugs were withdrawn from the top of the tunnel, and the grout cut through with a drill to determine its set and fill. The best results were obtained when the steam jet was used, the cement seeming to have swollen in setting. Where the cavity was not entirely filled the force pump was used to finish the work. In the shafts the pipes were concreted fast as placed, the steel casing being left in.

In driving the tunnel the water was taken care of by two 4-inch pulsometers, and by two steam ejectors rigged tandem—that is, one at the bottom of the shaft and one half way up. On the completion of the tunnel the water of condensation and leakage amounted to four and one-half barrels per day.

The tunnel was finished December 1, 1899, and gas was turned on about December 3. The dripage decreased to two and one-half barrels a day in summer, and increases to nineteen and one-half barrels a day in winter.

**CHARLESTOWN TUNNEL SIPHON.**—The Charlestown tunnel was commenced as soon as the air lock could be spared from the Malden tunnel. The shafts were sunk in midstream from temporary platforms, and did not differ materially from those of the Malden tunnel.

For convenience in handling the water in working from both shafts at once, the summit was placed between the shafts. This tunnel was driven without a shield, under an air pressure of 28 pounds, the clay being stiff enough to maintain the heading except in one part where gravel was encountered in the roof. Here poling boards, horse manure, etc., were used, as in the Malden tunnel, except that the poling planks were worked back on the lagging when cut off, instead of the shield, as in that tunnel.

The "goose neck" was turned in less favorable material in this tunnel, and on removing the bracing the flat side broke in. After ineffectual attempts to patch it a concrete lining was placed, as thick as would allow the introduction and turning of the pipe. These were common bell and spigot pipe, 12 feet long, and were made up with cement joints. The pipe was placed in the shaft on the Boston side first, and the concrete was brought up to the top of the steel caisson. The tunnel pipe was then started at that shaft and laid toward the Charlestown side.

A 3-inch pipe, provided with open tees, was suspended in the roof of the tunnel, and each length of 42-inch pipe was concreted as it was placed. The concrete was mixed over the shaft and dropped through a chute to a car that ran inside the pipe already laid, and was then dumped, remixed and rammed by men standing alongside of the pipe. (Fig. 5.) Around the joints the concrete was made stronger and greater care was used to make it impervious to water. When the pipes were all laid and concreted the 3-inch pipe in the roof was flushed with grout. The shafts were protected by circular fenders, and also by outer channel fenders.

**RIVER STREET TUNNEL SIPHON.**—In the River Street tunnel the Brighton shaft was sunk 90 feet, and the Cambridge shaft 60 feet. It was commenced by sinking the Cambridge shaft without the steel caisson and running the tunnel in 80 feet without compressed air. At that point the clay changed to a vein of sand, and the heading came in, filling the tunnel for 40 feet and destroying the cross-section.

The general method of procedure was as is shown in Fig. 4. Poling planks were driven ahead, a couple of feet of sand was excavated, the surface was smeared with clay to hold the air and a bulkhead was thrown across. The clay bottom was then excavated, the lagging brought forward and a new start made in the sand. Progress was from 1 to 3 feet a shift in each heading.

The results in alinement were such that it was

necessary to make two offsets of 2 feet each to keep the transit line in the tunnel. Nevertheless the closing error was less than 0.05 foot.

**COST AND QUANTITIES.**—The cost of the Malden tunnel was \$34.35 per linear foot for driving the tunnel, \$15.50 per linear foot for the pipe, and \$4.80 per linear foot for laying the pipe and grouting, or \$55.64 per linear foot complete. On the Charlestown tunnel the cost was as follows: Driving and fenders, \$87.45 per foot; pipe, \$4.35 per foot; laying, \$9.60 per foot; total cost, \$101.40 per foot. The quantities were as follows: Concrete, 420 cubic yards; 42-inch pipe, 85 tons; cement, 260 barrels, at \$2.35 to \$2.75; sand, 200 tons, at 70 cents; stone, 600 tons, at \$1. At the River Street tunnel the cost was as follows: Driving, \$48.84 per foot; laying, \$45.45 per foot; pipe, \$5.36 per foot; total cost, \$99.65 per foot. The quantities were: Concrete, 560 cubic yards; stone, 1303 tons, at \$1.10; sand, 97 loads, at \$1.60; 48-inch pipe, 169 tons; cement, 859 barrels, at \$2.35 to \$2.75. Cost of labor on concrete in tunnel, about \$5 per cubic yard; cost, complete, of concrete in tunnel, about \$9 per cubic yard.

In these tunnels it has been demonstrated that in good clay, and in good clay only, a tunnel can be advantageously driven without a shield under compressed air; that the segmental lagging is an easy, economical and stable method; that breaks, even in bad ground, are neither necessarily dangerous nor prohibitively difficult; that a large tunnel, with concrete between the pipe and the lagging, although more costly than a smaller tunnel grouted, makes much tighter work; that turned and bored joints are a delusion and a snare; that it pays to point up the joints on the inside of the pipe with cement; that cement joints give the best results, and are the cheapest and most convenient; that lathing and plastering the lagging with cement, while under compressed air, is an advantage.

G. H. Finn is the general manager, and L. J. Hirt was the chief engineer of the Massachusetts Pipe Line Co. W. E. Silsbee had immediate charge of the Malden and Charlestown tunnels, E. C. Hayden had immediate charge of the River St. tunnel.

#### Sturtevant Centrifugal Spring Roll.

Centrifugal rolls, as formerly constructed, were fast running, for it was by peripheral speed that their great centrifugal crushing pressures were attained; but for some hard and coarsely crushed ores too high speed was found not always an advantage, by reason of excessive wear of the tires.

Experience has demonstrated that for each ore with roll crushing there is an economical tire speed, which is always indicated by tire endurance. When this fails, the rolls are running too fast and the speed must be reduced.

This experience has resulted in the invention of centrifugal rolls that can be run at any number of revolutions, fast or slow, that practical conditions require, and with uncommon pressures. The centrifugal spring roll, herewith illustrated, is claimed by

plain centrifugals, neither roll, shaft or bearing moves back at all.

The cut illustrates a 32" centrifugal spring roll. To those who need a fast running roll, this machine of moderate size, it is claimed, will give a large output. To propositions requiring moderate tire velocities, this offers a machine of great capacity. The centrifugal spring roll runs easily and does its work with little wear and tear.

The Sturtevant Mill Co. of Boston, Mass., has issued an 80-page circular, which will be mailed to them on application, fully describing these machines and others of their manufacture.

#### Possibilities and Limitations of Electric Pumping.\*

NUMBER III.—CONCLUDED.

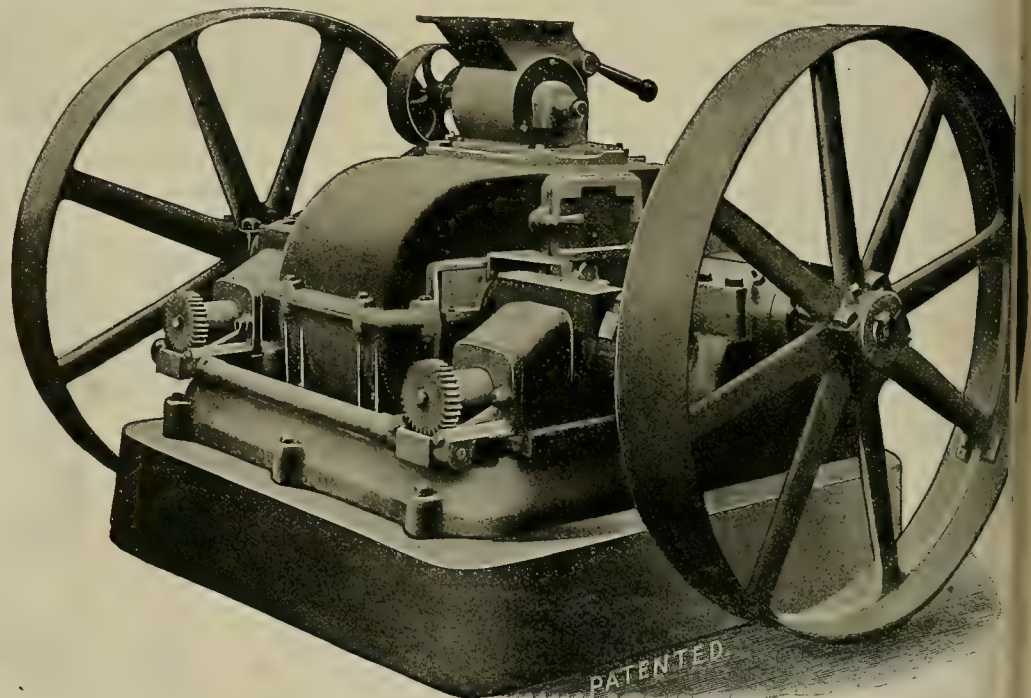
By LEWIS A. HICKS, C. E.

These considerations lead naturally to mounting the two pumps in a steel frame with bypass valves arranged that the first pump may deliver direct discharge or be thrown in series with the second when the lift becomes greater than the economical range of the first pump. Both runners are on a common shaft which immediately above pump No. 2 would be coupled to the shaft of a vertical motor, for motors in all, one above the other, being required each motor being mounted independently so that could be uncoupled and taken out without disturbing the others. Thus, when operating just below station level with a low lift, current would be supplied to the field coils of one motor and the low pump would be in operation while the runner of pump No. 2 and rotors of the remaining three motors would be running idle until the load and lift increased beyond the range of one motor when another could be cut in. In this way both pumps and motors would be operating more closely under economical full load conditions than if constructed as a single unit.

A telescope joint in the discharge pipe firmly fixed in one corner of the long frame would allow the lowering of the pump 18 feet as the water level receded and the uncoupling of an adjustable ball and socket joint would permit the telescoping of the pipe at the insertion of another length, thus allowing another gradual lowering. The entire assemblage would be handled from a hoist above, and motors would be protected from water by light sheet iron hood.

Such a combination worked out to suit local conditions anywhere would provide a much more efficient mechanism than those now in use, as the initial stage of any mine pumping—and would be equally useful whatever method were adopted for handling the water out of the mine.

If the water were permanently lowered to a given level, from which a high lift was required, some form of pressure pump, equipped with Riedler valves and cranked to the extended shaft of specially worded motor would best meet the requirements, but for lower levels, at least during the lowering process, the writer would propose centrifugals at each station.



Sturtevant Centrifugal Spring Roll.

the manufacturers, the Sturtevant Mill Co. of Boston, Mass., to have these desirable features. To each of the weights in the plain centrifugal roll has been added a set of powerful springs. These constantly press the weights out and hold the tire, even when the roll is at rest, with a force equalling the pressures given to common rolls by their outside springs. Centrifugal spring rolls, therefore, exert at the slowest speeds at least common roll pressures. As in

level in series, on the ground of flexibility and convenience in extending the system.

Compressed air for ventilation and machine oils must be always available for mining operations, and station motors could be protected from accidental flooding by light, watertight iron housing, into which

\*Submitted for discussion at the fifth annual convention of the Pacific Coast Electric Transmission Association, San Jose, Cal., June 18-19, 1901.



compressed air could be admitted to prevent the plates from buckling under water pressure, and the same means could be used to secure ventilation when the motor was in operation. Such a system would compare favorably in performance with anything now in use, and, in case of back flooding and accident to any of the submerged motors, the sinking pump would be available to work down from whatever level the water reached while no power was available.

Another use which the writer believes will be found for centrifugals is that of hydraulic mining. There are many locations where placer ground has been above available water supply which, with cheap electric power operating gangs of centrifugals in series, can be profitably worked.

It had been my hope for some time to present tests of a quadruplex centrifugal at this meeting, which will throw new light on a number of disputed points. The plant in question was originally designed under the writer's specification to pump 2800 gallons of water per minute from the Colgate penstock of the Bay Counties Power Co. to Lake Francis, a distance of 2 miles, with a vertical lift of 430 feet. Surplus water delivered by the flume during the period of light load was to be used on the Colgate drop to generate power to drive a 500 H. P. synchronous motor operating the pumps on the load mentioned, while during peak conditions the motor would be disconnected from the dumps and driven as a generator by a water wheel using water from the pump main under pressure head from Lake Francis, and the water so used would again be available on the Colgate drop for increasing the output beyond the capacity of the flume. Changes in the plans for handling the peak load eliminated the condition which had made the plan desirable, and it was now being finished up for use in moving several hundred thousand yards of earth, by sluicing, into the raising and reinforcing of the embankment forming Lake Francis. A similar pump, on a smaller scale, is now in successful use in placer mining operations in the central part of the State and offers the advantage of a large quantity of water under low pressure for cleaning up and hauling away material broken out with a smaller stream under heavy pressure.

**CENTRIFUGALS FOR WATER WORKS.**—The limits of this paper will only permit me to touch briefly this branch of the subject, which in itself might easily occupy the entire time assigned to me. Much of what has been heretofore said in regard to irrigation is applicable to small water works, and the centrifugal will find an enlarging field of usefulness in this direction. The economy of small centrifugals delivering 1000 to 1500 gallons per minute, can be maintained, if properly designed through a considerable range of draft and pressure within quite narrow margins. A test by the writer of such a pump shows less than 4% range in efficiency when pumping from 700 to 1400 gallons per minute and with changes in pressure from thirty to forty-six pounds, the range of lift being from 70 feet to 110 feet.

In larger plants for city use, electric applications come in direct competition with the most highly specialized and efficient machinery made, and the comparison between modern vertical triple expansion pumping engines, with pump and steam cylinders in line, and the best forms of power pumps, direct geared to motors, with the necessary speed reduction between motor and pump, if made on the basis of efficiency, cannot fail to flatter the high-duty pump. In such cases, however, efficiency may not tell all the story, and it may well happen that the advantages incidental to cheap water-generated current—relatively low first cost of apparatus used and economy of attendance—will more than overcome the difference in efficiency. In electric applications on a larger scale an economy of 250,000 foot-gallons per kilowatt hour should be attained against a possible comparative performance of 300,000 foot-gallons by the best steam pumping engines.

The ultimate economy of either plan is a matter of nice engineering investigation which requires complete data of fuel, power and investment costs in conjunction with accurate knowledge of what may be expected in the way of performance by existing apparatus. It must, however, be apparent to any one familiar with the subject that the issue is an open one, and that local conditions may easily overbalance other considerations and make the electric plant the more economical.

Manufacturers become the repositories of accumulations of specialized information pertinent to their own line of work, but the writer believes it to be the province of the engineer to keep so closely abreast of the best practice as to be able to give his clients the advantage of selecting the apparatus best suited to his requirements, and such advice is valuable proportionately as it is based on a comparative knowledge of all the apparatus available.

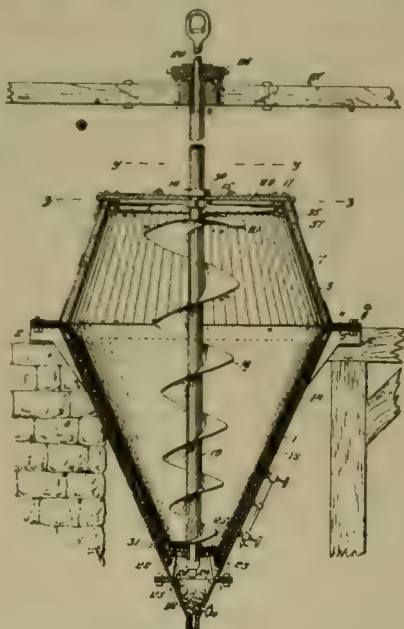
The writer wishes to disclaim any prejudice or preference for any particular style of pump, and would consider himself bound to use or recommend for a given duty the pump best suited to perform it. If there is any leaning in his mind toward a rotary or centrifugal type, it is because of the advantages and possibilities offered by reason of the single-revolving element in direct connection with electric motors; but the prominence of this thought is due simply to the fact that the discussion is understood to be concerning electric apparatus.

## Mining and Metallurgical Patents.

Patents Issued October 15, 1901.

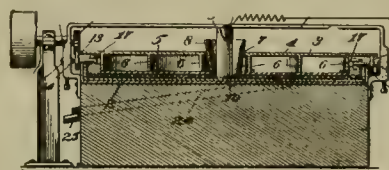
Specially Prepared for the MINING AND SCIENTIFIC PRESS.

**ORE FILTER.**—No. 684,654; C. Voelker, Helena, Mont.



A funnel-shaped tank having an annular flange at upper end, a top or hood having annular flange at lower end for engaging over first-named flange, an open-work filter holder arranged in tank and conforming to its shape, a filtering material engaging against inner surface of holder, the filtering material having lower end secured at lower end of holder and upper end secured between flanges and screw for operating in tank.

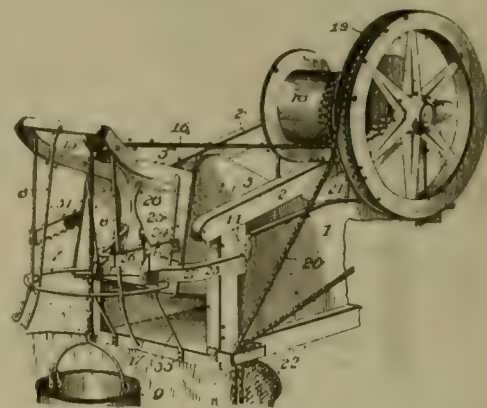
**MACHINE FOR EXTRACTING PRECIOUS METALS FROM ORES.**—No. 684,672; L. Chandlee, Colorado Springs, Colo.



A pan mounted upon a suitable standard, mercury carried in pan, a disk adapted to be moved on surface of mercury comprising upper and lower plates and spacing cross-pieces, disk being closed at periphery, a hopper mounted in center of disk, means for supporting disk at edge so that it may be revolvably held above pan, a porous cup mounted in hopper and resting upon an insulating block in pan so that cup will engage mercury but will be insulated from pan, an anode consisting of a metallic cylinder connected with one pole of any source of electricity, the cylinder being inserted in porous cup and in chemicals contained therein, a cathode connected with other pole of electrical source and extending into mercury in pan, and means for revolving disk, structure being such that pulverized material delivered into hopper will be worked outwardly to periphery of pan upon surface of mercury, the mercury being kept in a

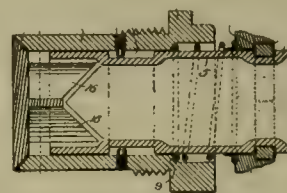
quick and attracting condition by electricity passing from anode to cathode, and means for collecting overflow from pan comprising a trough arranged around base of machine.

**HOISTING AND DUMPING MACHINE.**—No. 684,768; G. H. Bowers, Salida, Colo.



A stationary frame, a tilting bucket frame, a supplemental frame having projecting journals passing through side bars of bucket frame into stationary frame and forming axis of bucket frame, offsets on supplemental frame which co-operate with bucket frame, a mutilated gear on one journal of supplemental frame, a rack bar co-operating therewith, a drum geared to rack bar, a bucket, a hoisting cable wound upon drum and means for operating drum.

**AIR COMPRESSOR VALVE.**—No. 684,565; W. H. Caster, Angels Camp, Cal.



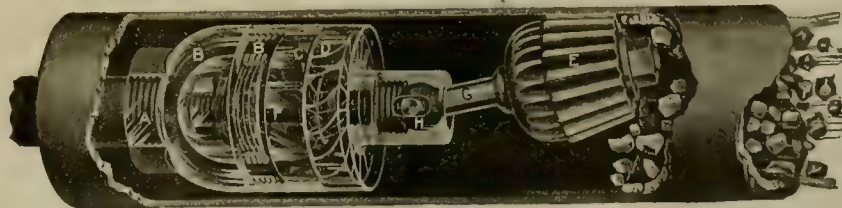
A cylindrical casing having a valve seat formed at one end, an enlarged counterbored turning flange at opposite end and screw threads by which it is fixed in operating position, a valve consisting of a head fitting and closable against seat, a cylindrical body slidably guided within casing having a groove or channel turned around its central portion and a groove around outer end, pins passing through sides of casing entering central groove or channel, acting to prevent valve from being disengaged from casing, a sectional ring fitting groove in outer end of casing and projecting beyond circumference of casing, a collar removably fitting outer end of valve having lower face grooved or channeled and corresponding with counterbore in outer end of casing and overhanging ring and a spiral spring surrounding valve having one end contacting with bottom of counterbore in casing and other against groove in valve collar, whereby valve is normally closed.

**PRECIPITANT FOR RECOVERING METALS FROM SOLUTIONS.**—No. 684,578; C. W. Merrill, Alameda, Cal.

A precipitant for recovering precious metals from cyanide solutions which consists of a combination of zinc and a gritty inert non-metallic material in a finely divided condition.

### The Atlas Tube Cleaner.

The Atlas tube cleaner is designed to run either by water or steam. The source of power, as shown in cut, is a miniature water wheel of the impact and turbine type D, connected to which is the power



The Atlas Tube Cleaner.

shaft F. At the end of the shaft is a toggle joint H, connecting the cutter shaft G, on the end of which is the cutter E, which removes the scale. The water enters at A into the chamber B B and through the port holes or nozzles C, striking the buckets of the impact and turbine wheel D, causing it to revolve at the rate of 4000 revolutions per minute under a pres-

sure of 100 pounds, and causes the cutter E through the toggle joint H to revolve in a gyrating and roweling motion, disintegrating and dislodging the scale, which is washed through the tube by the water passing through from the water wheel D. The tube cleaner is designed to work at any pressure from 60 to 150 pounds. The manufacturers say that from 100

to 120 pounds has been found to be the proper pressure to use for ordinary scale.

The Atlas tube cleaner is made and supplied by the Atlas Pipe Wrench Co., Flood building, San Francisco, Cal. They were awarded the first prize at the Buffalo Pan-American exhibition for both the Atlas pipe wrench and the Atlas tube cleaner.



## MINING SUMMARY.

Specially compiled and reported for the  
MINING AND SCIENTIFIC PRESS.

### ALASKA.

Three parties of the U. S. Geological Survey have returned from Alaska to Washington, D. C., where the maps and reports have been made. One party, led by T. G. Gardiner and A. J. Collier, surveyed the country north of Nome. A second, headed by W. J. Peters, made a reconnaissance of the country between the Koyukuk river and the Arctic coast at Point Barrow. The third party explored in the interior country bounded by the Koyukuk, Dall, Old Man and Kobuck rivers.

### JUNEAU.

The Treadwell Co., at Douglas, will make extensive additions to its plant during the coming winter. New compressors will be installed and many more air drills added to the equipment of the mines.

At the Alaska Perseverance M. Co.'s mine, near Juneau, Supt. Lonsberry states that the tunnel will be run in about 2500 feet and will crosscut the lode, giving from 1500 to 1800 feet of stoping ground. They will put in a compressor and air drills next spring, and possibly a mill.

At the Boston King quartz mine, near Juneau, J. Wagner manager, a tunnel 125 feet long has been completed and preparatory work done toward the erection of a 10-stamp mill in the spring. Work on the ledge will continue through the winter.

The Lemon Creek Co. have the hydraulic pipe in place on the placer mine ready for operation in the spring.

### NOME.

At the newly discovered Candle Creek district it is stated that only surface work has been done on most of the claims. It is stated that before the winter season is well on a camp of considerable size will be well established on Candle creek or the Keewauk river, of which it is a tributary. T. Noyes, formerly of Butte, Mont., has been appointed recorder of the new district.

### ARIZONA.

#### GILA COUNTY.

T. Crandall, Supt. of the Del Shay mine, on Tonto, near Globe, states that they have made the connection between two shafts 264 feet apart and 95 and 137 feet in depth. A large amount of ore has been blocked out that carries good values in gold, silver and copper, and the question under consideration is the method of treatment, which will be either concentration or smelting.

#### GRAHAM COUNTY.

The Shannon Co. at Clifton has completed 3 miles of railroad construction to the smelter, and expect to have their 500-ton reduction plant in operation by January 1. A 500-ton concentrator will be completed early next year. With the smelter running the company expects to produce 1,000,000 pounds of copper per month, and with the completion of the concentrator this will be increased to over 1,600,000 pounds per month. The company then expects to be in position to earn dividends with copper at 12 cents in New York.

#### MARICOPA COUNTY.

The Sahara claims near Wickenburg, on which the recent strike of native silver ore was made, has been bonded by the owners, Nickles, Brennenman & Miller, to R. Lloyd of Colorado Springs, Colo., at \$60,000, it is stated.

#### MOHAVE COUNTY.

The Yucca Cyanide M. & M. Co. are working on the San Francisco mine, Cedar valley, near Kingman. The shaft is down 237 feet; the face of the lower tunnel is in 320 feet and shows 2 feet of good ore. Water is coming in the shaft, and it is expected that within another 100 feet there will be sufficient obtained for milling. C. D. Pickering is manager.

The Kingman M. & Ex. Co. has sold the Railroad and other mining claims in the Gold Road country, near Chloride, to G. H. Hooper, who will go to work on it at once.

#### SANTA CRUZ COUNTY.

The Melba M. Co. are developing the Alta mine, near Harshaw. The Alta is an old mine, idle many years. A new hoist, boiler and gallows-frame and pump have just been installed and the shaft has been repaired and is being sunk from 150 feet to 300 feet depth. The ore is lead and silver and carries copper glance. R. L. Hammil is superintendent.

J. M. Manon of Washington camp, near Patagonia, says that on many outside claims of different companies the annual assessment work is being done.—The Duquesne Co. will do over \$6000 assessment work on claims they own or have

under option.—The Pride of the West Co. is installing their new machinery, which will increase the output from 50 to 200 tons daily.—On the Poole group a new steam hoist has been put up to sink with to considerable depth.

### YAVAPAI COUNTY.

E. L. Phelps, W. Field, B. Grove and P. D. Brown, of Cripple Creek, Colo., have bonded the Good Hope and Smugler mines near Prescott of J. Chambers. The price is \$10,000; time one year. The bonders expect to sink a shaft 200 feet below the level of the tunnel. The tunnel is in 500 feet.

The Jessie Mines Co. has been incorporated at Jerome to work the Little Jessie group of claims. J. S. Jones is president and H. Brisley secretary.

### CALIFORNIA.

#### AMADOR COUNTY.

The Central Eureka at Jackson has paid monthly dividends regularly for eight months. Six dividends were paid at the rate of 2½ cents per share, aggregating \$60,000, and two dividends at the rate of 2 cents per share, aggregating \$16,000, making a total of \$76,000. The shaft is down to a depth of 2000 feet and the mine opened to the 1850 level, from which ore is now being supplied to the mill. W. R. Thomas is Supt.

The drift from the 600-foot level of the Fremont has been run into the Gover mine, near Amador, and has developed a low-grade ore body 110 feet wide, which is claimed to be milling rock, estimated at between \$4 and \$5 per ton. It is reported that a 60-stamp mill will be erected in the spring.

At the Mitchell mine, near Pine Grove, the 10-stamp mill is kept running steadily. A new ore body has been opened on the 300-foot level, from which the mill is being supplied.

The Wildman-Mahoney mine, at Sutter Creek, has been sold to an Idaho company. The new company will sink the Mahoney shaft. The Wildman shaft is being repaired.

#### BUTTE COUNTY.

Two new gold dredgers are being constructed in South Thermalito, one just north of the Wills & Gable prune orchard, the other in the Briggs peach orchard. Both are of the Rison or Postlethwaite type.

#### CALAVERAS COUNTY.

Prospecting work preparatory to dredging in the Calaveras river at Jenny Lind is being done, and when completed dredgers will be built to work the ground.

The Emery M. Co. at El Dorado are putting their hydraulic mine in condition to start up for the season's run. Sixteen men are employed.

There are about 100 men employed by the Calaveras Water & M. Co. on the ditches to get in readiness for operation.

E. Rigney has seven men at El Dorado getting his hydraulic mine in shape for the winter's run.

P. Lancell continues to take out large quantities of nuggets from his recently discovered channel at Buckeye. A shaft has been started, but is not yet down to bedrock. It is reported that an offer of \$25,000 has been made for the property and declined by the owner.

G. Bauman of New York and P. L. Schuman are owners in the North Star mine, near Mokelumne Hill, and it is reported that they will soon begin the erection of buildings on the millsite for the 20-stamp mill that has been stored at the mine for some time. The North Star has a tunnel in 1700 feet, which is being re-timbered.

#### LOS ANGELES COUNTY.

It is reported that the Murphy Oil Co.'s oil properties at Whittier have been bought by an Eastern syndicate, the United States Steel Corporation. The object of buying it is said to be to obtain a fuel supply for a steel plant to be located at Los Angeles or vicinity on the completion of the Salt Lake Railroad, which will supply iron ore.

#### MONO COUNTY.

R. Doyle of Chicago, Ill., an owner of the Mammoth mines, at Mammoth, has made arrangements to take out a test mill run of ore with a view to reopening the mine.

#### NEVADA COUNTY.

A. D. West of Marysville, manager of the Diamond M. Co., operating near Washington in Diamond Creek mining district, says the property of the Diamond Co. is a tract of 210 acres on, he believes, the Omega channel. A tunnel has been run into the mountain 700 feet, reaching the gravel channel so that it can be drained and worked.

A new 20-stamp mill will be put up at the Yuba mine, near Maybert, to take the place of the old one now on the property. The Yuba mine now gives employment to about fifty men.

At the Gold Tunnel mine on Deer creek,

near Nevada City, a new building is being erected over the hoisting plant. Supt. E. Lawrence is rushing the underground work.

The mill for the Ensign mine, between Sweetland and Birchville, is being constructed. The company to work the Ensign was organized by Dr. Fouch of North San Juan.

The Gold Crown Con. G. M. Co., owning the Gold Crown, Examiner, Crown Point and Hornet mines at Omega, has equipped them with machinery consisting of a hoist, engine and boiler, the latter of power sufficient to run ten stamps. The development consists of a tunnel on the 3½-foot vein, opening a pay shoot 450 feet long, which will mill about \$15 per ton. A shaft is being sunk to open up levels at 180 and 280 feet.

The Pine Hill mine, at Wolf, is to be opened up and men have already been put to work. Mr. Milliken has resigned and C. Rosenthal has been selected to succeed him as Supt. by the New York syndicate which owns it. H. Thomas of Grass Valley has been appointed foreman. A new boiler has been ordered and a Cornish sinking pump will be put in. The company, Supt. Rosenthal states, intends to build a smelter near the mine. The Pine Hill ore is copper-bearing. A test of average ore, 400 pounds, it is said, returned \$17 gold and 11½ copper per ton. There is a double-compartment shaft now down 200 feet on the mine which is to be sunk to 1000 feet.

The Providence mine, at Nevada City, has been bonded by C. Heller of Los Angeles.

Work of reopening the Boss mine, near North San Juan, is to be commenced at once, San Francisco people now having control of the property. G. McCullough is Supt.

#### PLACER COUNTY.

At the Black Canyon mine, at Westville, the shaft is now down 200 feet. Supt. Pinkston is working three shifts.

The Pioneer quartz mine, at Damascus, will start up again as soon as there is sufficient water to provide power. Supt. Stone has already put some men on.

The Bob Lewis drift mine has started up again, H. M. Jarvis Supt. Buildings are being put up for the winter, and two power drills are working in the tunnel. They expect to break through into the channel about January.

At the Rawhide mine, near Emigrant Gap, a dam and 4000 feet of flume have been put up, providing water power. Ten men are being worked under Supt. J. K. Patrick.

The Bellevue people propose sinking a new shaft on their mine near Ophir. A steam hoist will be put in.

The 20-stamp mill is nearly completed at the Three Stars mine, at Ophir.

#### SHASTA COUNTY.

An Eastern company is negotiating to buy the Quartz Hill mine, near Redding, for, it is reported, \$65,000. The mine has been idle for over five years.

#### SIERRA COUNTY.

Morse Bros. have completed the construction of a reservoir at the Hilo mine, near Downville. The reservoir consists of a reservoir 450 feet in length and required about 3000 tons of earth in its construction. It took about six weeks to finish the work, and they made good wages on the contract.

J. W. Finney has bought the controlling stock interest in the Oxford mine, formerly the Good Hope, situated near Downville. It is intended to reopen the mine.

The California Debris Commission has received an application to mine by hydraulic process from G. F. Edwards in the Philo Haven placer mine, near Gold lake, to deposit tailings in Mud lake.

#### SISKIYOU COUNTY.

G. W. Trefren, manager of the Siskiyou copper mine, reports that the quartz vein recently struck on this mine assays \$150 to the ton from croppings that can be traced for several hundred feet.

At H. E. Espey's mine on Beaver creek a ditch is being cut from Soda creek and Snake creek to unite with the Patterson ditch. A contract has been let to extend the Patterson ditch at \$2 per rod. This mine is owned by a Seattle syndicate who are represented by Mr. Espey as manager.

The Adelaide is at the foot of Sterling mountain, at the junction of Grouse and Beaver creeks, and has been worked in by W. A. Montgomery for the past eight years. During the present summer he succeeded in locating the old channel bed. The dirt will average \$4 to the cubic yard and there is some heavy, rough gold that carries quartz.

The Siskiyou placer mine, near Happy Camp, is to be started up again this fall, and preparations are now being made.

C. C. Webb of Montague has interested San Francisco people in a proposition to build a 20-foot dam in Shasta river, near

Montague, which will give a head of 16 feet, for a power plant to operate mills and factories. Timbers for the dam are being put on the ground. The company expect to put \$25,000 to \$30,000 in the enterprise.

E. H. Scott, Supt. Con. M. & Dredging Co., operating at Callahan, states that the machinery will soon all be in place and they hope to start up by the first of the year.

J. W. Coyle and S. Smith have struck a rich ledge in Bushy gulch, near Hornbrook, and are arranging for a sampler run of ten tons of ore at the LaFlesh mill at Henley.

### TRINITY COUNTY.

The pipe camp of the Sweepstake M. Co. on Oregon mountain, near Weaver-ville, employs forty-five men under Supt. B. Glatz of the Francis Smith Co. of San Francisco. Eight miles of 30-inch pipe has been made. The pipe is made from Nos. 7 and 14 sheet iron, and of the latter number the men are now making a mile a week. The force will work until the snow comes and then operations will be suspended until spring.

### TUOLUMNE COUNTY.

Work on the Crystalline mine, near Rawhide, is being pushed by A. C. Morrison, the manager. A new double drum 13x16 hoist, which can work the mine to a depth of over 1500 feet; a duplex compressor to run six baby drills; two horizontal tubular boilers, weighing about 30,000 pounds, together with a Brownell heater and purifier 36 inches in diameter and 9 feet high, are to be installed. The present hoist will be removed to the old shaft, which will be unwatered. This will necessitate the erection of two large gallows-frames. A three-compartment shaft is to be sunk to the 600-foot level.

The Campo Seco M. Co., which is to operate on the Eberhardt ranch, near Jamestown, has been organized in San Francisco with H. A. Crane as president and S. Solomon as secretary. F. Federici is the superintendent of the company. It is announced that a three-compartment shaft is to be sunk.

The Dead Horse mine, near Groveland, has been bonded to C. Y. DeLay, and operations are to be commenced and sinking machinery installed.

The hoisting machinery at the High Point mine, at Stent, is being moved to Rawhide, and is to be set up at the Rawhide Extension mine, formerly the Mount Hood.

In the Rawhide mine, at Rawhide, at a depth of 20 feet in a winze being sunk from the 1800-foot level, they have found an ore body 18 feet wide that assays \$19.25 to the ton.

At the Eagle-Shawmut mine the mill was shut down on the 11th inst. It is being cleaned up and repaired. The overhauling will be finished in time to start up again about November 1st. The capacity of the chlorination plant is being doubled. In the mine work goes on uninterruptedly.

The Marion quartz mine, near Columbia, has been sold to A. R. Otter by C. Thrasher.

Bluett & Gillis are operating the Lantissama mine, near Tuttle town, and have 200 tons of ore on the dump. The hoist, compressor and pump are run by a gasoline engine.

The Little Beauty quartz mine, near Arrastraville, has been bonded by F. C. Cullers at \$9000 to G. E. Joninon, R. Plummer, T. Ryan and L. Wiseman, who have commenced development work and will continue the lower tunnel 100 feet.

The Stockton Smelting Co. has been incorporated with its office at Stockton, capital \$100,000, to build a smelter at Jamestown which will have five ovens, capacity thirty tons a day. The incorporators are C. C. Franklin, C. F. Babcock, W. A. Morris, P. J. Wallace and others, all of Stockton.

### YUBA COUNTY.

U. S. District Attorney Woodworth, under instructions from the Attorney General at Washington, has begun an action in the U. S. Circuit Court at San Francisco, against J. O'Brien of Smartsville, this county, to compel O'Brien to execute a conveyance of the lands he had previously given an option on at \$2500 to the U. S. Debris Commission. The complaint also prays for \$1000 damages sustained by O'Brien's refusal to live up to the terms of the contract.

### COLORADO.

#### BOULDER COUNTY.

The Black Swan M. & M. Co., owners of the Black Swan, Mountain View, Atchison and Sunshine claims at Wall Street, are, in conjunction with Eastern capital, erecting a new cyanide mill adjoining the mines, to be completed about the first of the year and to have a capacity of thirty tons per day. The erection of the mill is being superintended by W. H. Nichols.

The Iowa M. & M. Co., recently organ-



ized by Sioux Falls, S. D., people, will operate the Rowell property, consisting of the McCarty lode claim, considerable placer ground and some timber land, near Eldora. A shaft on the McCarty is to be sunk 100 feet and if it develops into a milling proposition it is the intention to build a small mill and treat their own ore. J. Rowell is Supt.

#### CLEAR CREEK COUNTY.

(Special Correspondence).—The Franklin Con. M. Co. was recently organized to operate the Franklin and Silver Age mines, and the Wilkie and Silver Age mills, all at Idaho Springs. A new compressor plant and water wheel will be put in. A. F. Bain is the manager. A lateral is being driven from the Newhouse tunnel to the Gem—1000 feet. When this is completed the Franklin proposes to continue the lateral on into their grounds.

The Newhouse tunnel, now in nearly 15,000 feet, first cuts the Gem and Gem Extension ledge, and farther on the Sun & Moon, Star, Bertha and Adducille in the order named. The first two veins are in Clear Creek county, the last three in Gilpin county. The Sun & Moon vein is cut about 2200 feet below the surface by this tunnel. Shipments amounting to a considerable tonnage are being made from the tunnel level of the properties named. The tunnel has double track, the cars being drawn by mule power, but it is expected to have electric locomotives doing the work within a few weeks.

The Gem, Gem Extension and Main Trunk are on the same vein and under the management of W. E. Renshaw. The main shipments from the group are being made from the Gem Extension shaft, which sinks 700 feet from the surface, though forty railroad cars of ore have been taken from the lower workings through the Newhouse tunnel. The Newhouse mill at Idaho Springs is supplied with ore mainly from this group. The workings from the tunnel level are over 1200 feet lower than the base of the Gem Extension shaft. Work on this group is progressing from the tunnel both east and west on the main vein. Two drifts are run westward on the Main Trunk—one 200 feet along the hanging wall and another 250 feet on the foot wall, the two being over 40 feet apart. A slope 75 feet high also extends along the hanging wall. The ore exposed next to the foot wall appears to be 7 to 9 feet wide and that on the hanging wall 3 to 7 feet wide. It comprised an iron and copper sulphide, with gold and silver values, although the copper is of some importance. The work east of the tunnel, on the Gem and Gem Extension, consists of a 180-foot drift along the foot wall and one of 75 feet next to the hanging wall. In one place it is 74 feet between walls. It is stated that the Gem vein is wider at this level than it is in the upper workings. The gangue rock on the tunnel level comprises a quartz, lime and porphyry. It is said the ores in the upper workings ran 1½% to 6% copper and in the lower workings about 1½%. When the Gem vein was first crosscut by the Newhouse tunnel a small body of steel galena was found, but it was soon worked out, though it is believed to extend below this level.

The Sun & Moon drifts from this tunnel extend 300 feet on each side of it. This group has two veins, both crosscut by the tunnel. Shipments from this property amount to 700 tons of ore per month. Of this 600 tons are concentrated at the Roberts mill, the other 100 tons going direct to the smelter.

The Lucania tunnel is a new project, at the head of which is Rees C. Vidler of Colorado Springs. The tunnel starts at the foot of Champion mountain, on Fall river, and is to cut northeasterly through Champion mountain and into Quartz hill, above Central City, striking the veins of the latter over 2000 feet below the surface. The company behind the project has secured thirty-eight claims along the tunnel's course.

The Roberts mill, which is confined strictly to custom work, runs an average of fifty tons of ore daily and operates continuously. Crushers, rolls, Huntington's, jigs, slime table, buddle and other tables are used. The Roberts slime table, illustrated in this paper of September 28, is in use and is an interesting machine.

Idaho Springs, Oct. 19. WASCOTT.

(Special Correspondence).—Lawson is on Clear creek, the second station below Georgetown. On the south side, about 1200 feet higher than Clear creek bed, is Silver Creek, noted as the location of the Jo Reynolds group, whose record as a producer is a part of the early history of the county. The Jo Reynolds workings, from the surface, are about 700 feet deep, in which operations are not being pushed at present. The group belongs now to Mr. Morton, whose son, R. B. Morton, is in charge. To drain the old workings and afford cheaper transit of ore to the railroad a tunnel is being driven from a point near the town, which is now in 1500 feet.

It will cut 180 feet below the old workings and open up some virgin ground.

On the opposite side of Clear creek, on Red Elephant mountain, are the Tabor, Schwartz, Young America, St. John, Free America, White and others. All these are under bond and lease and other control of P. R. Stanhope and associates, who have started the Tabor tunnel, with the purpose of draining these properties and aiding in further development. The mines are opened by shafts from the surface and were formerly producers. The Schwartz shaft is said to be 700 feet deep, extending below the level of Clear creek. The ores of this mountain are mainly silver and lead, with fair gold values. The tunnel now being driven will cut some of the veins as deep as 1000 feet. The power plant for this work consists of a 35 H. P. gasoline engine, which operates a 30 H. P. electric generator. The latter operates a motor in the tunnel, driving electric drills.

Lawson, Oct. 19.

#### GRAND COUNTY.

A company has been organized which proposes to supply Clear Creek county with electricity to be produced by water power. A reservoir is to be built at the junction of the Grand and Frazier rivers, near Hot Sulphur Springs, to cost about \$500,000. E. A. Lee is the engineer. State Engineer A. J. McCune has approved the plans. The dam will be 570 feet long, 75 feet high, and will form a lake 2100 acres in area. A flume will be run 9 miles down the river to secure 250 feet head for the power.

#### LAKE COUNTY.

(Special Correspondence).—The A. M. & W. mill is handling about ninety tons of zinc-lead ore from the 600 and 750-foot levels, which is hoisted through the old Adams shaft. The product of the mill amounts to about seventy-eight tons concentrate, being sixty tons zinc and eighteen tons lead. A small per cent of iron—not over 10%—is also saved, mostly with the lead. The lead concentrate does not carry more than ½ of 1% silica, the zinc concentrate about 2½ to 3½ silica. The ore is crushed by Huntington grinders to forty mesh and is sized by hydraulic settlers for the two sets of tables which make the separation.

The Denver City mine, on Fryer hill, under lease to Kuhn, Lindsay, Esco, Standy and Swartout, has begun shipping about fifty tons daily from the workings of the 315-foot shaft. Good silver values in an iron ore are obtained.

Leadville, Oct. 16.

A strike has been made in the White Cap mine, at Leadville, operated by the Nayr M. Co., under the management of J. Shinn. The company has been working for a year on a lease deepening the shaft from 500 feet to 700 feet. On a drift from the bottom the strike has been made of ore sampling 50% lead, 15 ounces silver and .06 of an ounce gold. Chicago and Denver men own large interests in the company.

#### PARK COUNTY.

Two smelter plans are said to be progressing which have in view the erection of smelting plants in the Alma district. One of these, it is said, will be built at Alma, while the other may be built in Buckskin gulch or at the junction of the Colorado & Southern.

#### SUMMIT COUNTY.

(Special Correspondence).—The Augusta M. & Co., T. R. Griffith manager, are driving a 1000-foot tunnel from French gulch into Farncom hill. The breast is now at a point 790 feet from the entrance. It is expected to cut the Juventa vein 250 feet farther ahead at a depth of 560 feet below the surface, and 370 feet below the old workings. From the latter large shipments were made from 1890 to 1895, much of which yielded a net return of \$17 per ton, the values being mainly silver. These shipments were mostly from the first level up. Very little of the ore between the first and second is stoped out. It is claimed the mill ore on the dump amounts to 10,000 tons. At the tunnel entrance is an air compressor, electrically operated. The tunnel heading is advanced 3 feet a day.

Breckenridge, Oct. 17.

#### TELLER COUNTY.

A new strike of gold ore has been made in the Elkton mine at Cripple Creek. Drifting at the 700-foot level, 100 feet from the main shaft, a vein 5 feet wide of fluorspar and talc has been opened with neither wall shown. The vein matter, it is reported, glitters with sylvanite and gold. The vein surrounds a large open chimney 30 feet in diameter in which is a lake of unknown depth. The ore, when brought to the surface, showed a blue color. It is of the consistency of dough, showing grains of metal like sand in mortar.

Stratton's Independence has put in operation its new plant of machinery. The

plant cost about \$40,000 and will hoist from a depth of over 3000 feet. In making the change no time was lost, the new galloways-frame being built around the old one. The output of the mine for October will be about 8500 tons, averaging about \$37 a ton. The main shaft is down 1330 feet.

#### IDAHO.

##### BEAR LAKE COUNTY.

T. Moore of Montpelier reports that a strike of very rich copper ore has been made in Montpelier canyon, 10 miles east of Montpelier. J. Oberly is owner.

##### IDAHO COUNTY.

The Northern Star Co., of which W. H. Plummer of Spokane is manager, expects to erect a 5-stamp mill upon its property near Dixie.

A 10-stamp mill is being built for the Wise Boy mine at Buffalo Hump, and will be taken in over the snow to the mine and put in operation. The mine is owned by A. W. Moore and son. A sawmill plant is to be put up to cut lumber and timbers to be used in the mine and for the mill building. The stamp mill consists of two 5-stamp batteries of 950-pound stamps, a concentrator, a tramway and a 35 H. P. engine and boiler.

J. D. Glover of St. Paul has bought a half interest in the Gold Bug and Columbia properties. The claims were owned by a Lewiston company, consisting of C. H. Harding, C. W. Colby, D. Trullinger, J. Nielson and others. The Gold Bug-Columbia M. Co. has been incorporated, with J. D. Glover as president. A contract has been let for 450 feet of work on the Gold Bug claim and operations will be actively pushed through the winter.

##### OWYHEE COUNTY.

The tunnel under War Eagle mountain is now practically 1 mile in length, with the face of the tunnel approximately 1800 feet below the surface. Thus far four ledges have been cut, but no commercial values obtained. The tunnel is being pushed on for the Chariot ledge.

##### LEMHI COUNTY.

C. G. Goss and associates have located a number of claims adjoining the Blackbird group, near Salmon City, and have had assays which gave as high as 8% nickel, 24% copper, \$2.20 gold and 1.88% cobalt. The Blackbird, owned by P. A. H. Franklin of Salt Lake City, yields ore that averages \$9 gold and 10% copper. P. M. McCree, formerly of the Bingham Con. mines at Bingham, Utah, is Supt. of the Blackbird mines.

##### SHOSHONE COUNTY.

(Special Correspondence).—The Snow Storm M. Co. of this place have cut the ledge at a depth of 540 feet, and now have 40 feet carbonate, copper ore, in a quartzite gangue. The ore will average 50% copper and 7.2 ounces silver.

Mullan, Oct. 20.

#### MICHIGAN.

##### HOUGHTON COUNTY.

At the Old Colony mine, at Houghton, a vertical shaft will be started at once to exploit the lodes shown up by the diamond drill.

On the Mayflower a new lode has been discovered by a miner who was chopping a stump for kindling at the edge of a hill. Feeling something under his feet, he investigated and found that it was a horn of copper. Clearing away the leaves and surface rubbish, the miner discovered a well defined lode. The mining captain was informed, a shot was put in and heavy rock, heavily charged with copper, was thrown out. The lode is 15 feet wide.

#### MONTANA.

##### CASCADE COUNTY.

The Boston & Montana Co. is planning to build another electrolytic refinery at Great Falls. The refinery will be located near Rainbow Falls, on the Missouri river. It is expected that construction will begin immediately.

##### DEER LODGE COUNTY.

T. Hird, T. Garrison, M. A. Mitchell and D. P. Bagnell of Spokane, Wash., and associates have bonded the Ophir mine, near Marysville, Mont., to W. A. Clark of Butte. T. Hird has been appointed superintendent. A plant will be erected and a two-compartment shaft will be sunk to the 300-foot level. The ledge is 50 feet wide and carries copper in ores similar to those of Butte. There is a 20-foot body of concentrating ore and a 2-foot streak of rich ore that will run from 12% to 18% in copper and from \$3 to \$6 in gold, with small silver values.

##### FERGUS COUNTY.

It is reported that \$100,000 has been offered by the American Gem M. Co., interested in which are C. D. McClure and P. A. Fusz of St. Louis, Mo., L. S. McClure of Los Angeles, Cal., and D. Jan-kower of Helena, for the sapphire ground

owned by the New Mines Co. at Yogo. The American Gem Mining Syndicate, with this ground, will then control the entire Yogo field. The American Syndicate also own a large group of claims on Rock creek, Missoula county, and, it is believed, intend to monopolize the mining of sapphires in the United States.

#### GALLATIN COUNTY.

A rich discovery is reported made near Red Rock lake, at a place now known as Dwelle City. The new camp has already about 300 inhabitants. There are said to be rich quartz as well as placer claims, and one assay from quartz showed twenty-two ounces in silver and \$45 in gold.

#### JEFFERSON COUNTY.

N. W. Pierson has leased the Miner mine, at Wickes. The Miner has been a large producer of gold and silver. There is a stamp mill that cost close to \$200,000.

#### LEWIS AND CLARKE COUNTY.

A strike of \$150 a ton ore is reported made in the Big Ox mine, near Marysville. C. J. Fulton is manager.

#### SILVER BOW COUNTY.

The Butte & Arizona C. M. Co. has bonded some property about 2½ miles southwest of Butte. One shaft has been sunk about 50 feet to water level, and another is being sunk to have machinery put in by the time water is struck there.

#### SWEET GRASS COUNTY.

W. H. Trowbridge of the Deer Creek M. & Dev. Co. states that the company has claims on Deer creek, out from Big Timber. The Custer lode, he says, is about 32 feet wide, the Dickson lode 12 feet wide. The ore is galena and assays \$26 a ton.

#### NEVADA.

##### HUMBOLDT COUNTY.

R. Battels of Golconda says that operations will probably be resumed in the mine and smelter of the Glasgow & Western Co. very soon. The Salt Lake office has ordered the water pumped from the mine's lowest workings. Since the shut-down a year ago the pump has been kept running to prevent the water rising above the 200 level.

##### LYON COUNTY.

The Ducktown M. Co. has been incorporated at Reno; directors, J. W. Hutchinson, Wm. Still and Geo. W. Callihan of Reno; A. W. Wilson of Joplin, Mo.; and F. C. Everett of Delphi. The company has bought and is developing the Ducktown claim, a south extension of the Ludwig copper mine, in Mason Valley.

##### NYE COUNTY.

(Special Correspondence).—The G. & H. Tunnel claims, owned by T. L. Oddie, R. Gordan, A. L. Hudgen, P. Manning and Brougher Bros., is at the south end of Oddie mountain, east of and adjoining the original Tonopah claims of the Tonopah M. Co. The tunnel is in 250 feet, with a 70-foot air shaft. The tunnel is headed for the extensions of the Mizpah and Burro ledges of the Tonopah M. Co.

Ore has been struck at 85 feet depth on the Cabin shaft of the Salt Lake Co., south of Tonopah and near the Valley View ledge. The character of the ore is similar to that in the Tonopah mines and values obtained are encouraging.

Butler, Oct. 15.

G. W. I.

##### WASHOE COUNTY.

The Senator G. M. Co., at Steamboat, is sinking its double compartment shaft at a rate of 4 feet a day. Water flowing in about three gallons per minute has been struck; it is quite warm, but not hot enough to impede working. No difficulty has yet been experienced in handling the flow. The shaft is still in sedimentary formation, but there is considerable pulverized quartz.

Mr. Bidwell of the Norton & Bidwell mine at Pyramid states that work is being done in a large ledge carrying \$120 per ton. An inclined shaft is down 90 feet. In some places the ledge is 18 feet wide. The values are in gold and silver and the ore is free milling. The company expects to erect a mill in the spring.

C. B. Bell, T. Dougherty, J. S. Miller and V. Bony of Reno have leased for three years from R. L. Fulton, for mining purposes, one-half of section 30, township 20 north, range 20 east, M. D. M., near Reno. The lease is to run for three years. A company will be organized to prospect this ground.

#### NEW MEXICO.

##### SOCORRO COUNTY.

The Silver Bar Copper Co., owning the Cooney mine at the Mogollons, has paid a third dividend of 6%, the former two being 3% each. The main shaft is down 325 feet; the producing vein is 15 feet wide and averages 15% copper across the entire vein. It is controlled by Colorado Springs people.

##### TAOS COUNTY.

H. H. Hankins is taking machinery to the Copper King mines, at Red River



City, and when it is all placed the company will begin extensive operations.—The Golden Treasure, at Red River, is again running, after a shut down. Manager Davis has been granted a lease for another year.

#### OREGON.

##### BAKER COUNTY.

J. W. Carr, president and manager of the Quebec mine, near Alamo, reports the first cleanup of the new 10-stamp mill for a fifteen-days run as \$14,000.

Mr. H. Longstaff, of Troy, N. Y., representing New York people, has bought the Carpenter Hill and Never Sweat claims of Hackett Bros., F. Andre and R. Hennessey for, it is said, \$11,000. The former owners have been doing development work on the mine for three years, working the ore in an arrastra. It is announced that the new owners will put up a 10-stamp mill and operate on a much larger scale.

W. E. Hurd, of Portland, manager of the Chelan group at Alamo, says the mine has a 20-foot vein that assays in parts as high as \$20. He is driving a tunnel which is now in 450 feet, giving "backs" of about 220 feet. This work is being done under contract.

The title to the Sturgill Bar placer mine, on Snake river, is in dispute. This is a placer claim that has been worked for years by M. Robinette and C. D. Reed. Recently some sheepmen have filed on the ground embraced in this claim as a home-stead entry, alleging that it is not mineral land. A contest will soon come before the local Land Office to determine the character of the land.

The Phoenix mine, in the Greenhorn district, near Baker City, has been sold for \$80,000 by W. C. Cowgill, C. C. Nipple and L. Y. Kadey of Baker City and F. S. Alexander of Spokane to an Eastern syndicate represented by W. R. Crawford, trustee, and C. Parker, E. M., of London. The new owners have, it is said, already ordered a 10-stamp mill. Considerable development work has been done, and there is claimed to be 3000 tons of milling ore on the dump. It is said the assay value of the ore on the upper levels averages \$10 to \$20 to the ton, while that on the lower workings goes as high as \$70 to \$100 per ton.

##### JACKSON COUNTY.

At the Ashland mine, at Ashland, the double-compartment shaft is down 770 feet and sinking on the ledge continues. The ledge, it is said, holds its size of 7 to 8 feet in thickness, and there is no diminution of the ore. Drifting is being done at the 700-foot level, and ore is being stoped at all the levels. The gold now runs about \$14.50 per ounce, the reduced value being due to the presence of silver.

The Rock Bowers' placer mine near Gold Hill have been sold to J. H. Bagley of Marshall county, Iowa. Mr. Bagley has secured options on other placer properties in that vicinity and bought water rights to provide water for continuous work. He will install two hydraulic giants and a complete plant.

##### JOSEPHINE COUNTY.

Manager St. John of the Rising Star, near Grants Pass, is arranging to add five stamps to the mill of his mine.

The Gold King ledge, a new proposition, near Grants Pass, has been sold by E. M. Mead to a Mr. Burk of San Francisco for, it is reported, \$13,000. The ledge was prospected by an 180-foot tunnel, exposing a 4-foot vein of free milling ore. Mr. Burk will put in a 10-stamp mill at once.

The Sunbeam mine, near Grants Pass, has been bonded to S. R. Burke of Tacoma, Wash., at \$11,500 for nine months. The mine has considerable development, there being a shaft 140 feet deep and a tunnel 70 feet long. Work will be begun at once upon the tunnel.

#### UTAH.

##### BEAVER COUNTY.

Dedmachy & Sellers, of Paris, France, have sold to S. Newhouse, of Denver, Colo., the Cactus group of mines near Frisco for \$200,000. Mr. Newhouse states that fully \$1,000,000 would be spent in the equipment of these mines. A concentrating mill of large capacity will be built at the mines, and a smelter, with a capacity of at least 500 tons a day, will be erected in the vicinity of Salt Lake City.

##### JUAB COUNTY.

The Madeleine M. Co., owning the Sunnyside and the Melinda lode claims near Tintic, has been incorporated; capital, \$25,000. J. B. Caldwell is president and W. F. Smith secretary and treasurer.

##### PARK COUNTY.

At the annual meeting of the Creole M. Co., R. J. Evans president, W. H. Ray treasurer and J. M. Lockhart secretary, it was decided to resume work on the mine, which is located at Park City.

##### SALT LAKE COUNTY.

The Stockton Queer M Co has been

incorporated, capital \$500,000, to operate the Copper Queen Amendment, Copper Queen Nos. 2, 3 and 4 and Bellevue, in the Rush Valley mining district. W. A. Morey is president and F. E. Arnold secretary and treasurer.

##### SUMMIT COUNTY.

Stoping has been commenced at the mine of the Comstock M. Co., at Park City. The main level and the stoping ground overlying it has been drained, and the ores can be handled without paying for the transportation of moisture. Manager Hickey is now drifting from three stations on the upraise, with all of them in ore.

##### UINTAH COUNTY.

The Thayne's Canyon Con. M. Co. has been incorporated by M. J. Hall, B. E. Hartwell, J. J. Thomas, F. Knox, all of Park City, and P. A. Simpkin of Salt Lake. Office of the company will be at Park City. F. Knox is president; M. J. Hall, vice-president and superintendent; B. E. Hartwell, secretary and treasurer. Twenty-two mining claims in the Uintah mining district, valued at \$125,000, are the property of the corporation.

##### WASHINGTON COUNTY.

A. E. Vandercook of San Francisco, B. Hastings of Arizona and J. B. Hall have prepared plans for a leaching plant with which to treat the Barbee & Walker tailings at St. George. Vandercook & Hastings have taken a bond on the tailings from the old Leeds mill, on a royalty basis of 50 cents per ton, the bonders agreeing to handle not less than 600 tons per month and to have their plant ready within ninety days. J. Kempe of California, who located the tailings as placer ground, was the seller. The same people have also bonded the Christy tailings from R. C. Lund. It is estimated that this mill alone has 218,000 tons. If the option is taken up, there will be in all four plants erected near St. George, with a total capacity of 100 tons per day.

#### WASHINGTON.

##### FERRY COUNTY.

The new town of Ferguson, on Trout creek, north of Republic, has ten frame houses and several tents, three saloons, a boarding house, a clothing store, a lodging house and a restaurant. At the town are three railroad camps and the engineers' camp of the Republic-Kettle River road. Near the town there are numerous large and well defined copper veins. E. Kelley & Co. have the Cache group, working a large number of men, and expect to be prepared to ship ore by the first of May. There are several other properties that show copper ores.

##### STEVENS COUNTY.

I. W. Anderson of Philadelphia represents Philadelphia people who own the Silver Butte, Great Western, Pennsylvania and the Philadelphia mines, near Northport, and has been examining the mine with a view to starting up again.

##### SKYKOMISH COUNTY.

J. R. Kendall, J. S. Ecker and G. C. Walker of San Francisco have bought of J. C. Quinlaven twenty-three claims on Red mountain, near Skykomish, which are rich in gold-bearing quartz. The price is stated to be \$40,000. The buyers have organized the Kendall Red Mountain M. & Dev. Co. to operate the mines and utilize a water power.

#### WYOMING.

##### ALBANY COUNTY.

A. F. Whitman, discoverer and owner of the vein of asbestos near Dover, shows samples of the asbestos with a long fiber and texture as smooth as silk, making the material very valuable for manufacturing purposes.

##### CARBON COUNTY.

B. McCaffrey of Cheyenne says that his company, of which W. G. Emerson of Denver is a member, intended to consolidate the paying mines in the southern Carbon country and connect them with the smelter at Grand Encampment by an electric railway system. The trolley system will, it is estimated, cost \$3,000,000 to construct.

A. Bragg has been given \$35,000 for an option on his P. & T. mine near Rambler. A large lead of white iron and two cross leads of heavy copper carbonates have been found.

#### THE PHILIPPINES.

What is claimed to be the first real mining deal, involving claims staked by American prospectors, has just been closed in Manila. J. D. Morgan, representing San Francisco people, has bought the "Utah" group of claims, on the Butuan river, owned by P. Imes and associates; the "Antimoke" group, owned by H. C. Gilde and others, and several single claims, owned by Robinson, Grey, Roper and another, all located on the south fork the Butuan river. The highest price

paid for a single claim was \$80,000 to Robinson, but more was paid for groups. In all \$250,000 was paid. There were twenty-five claims in all, twelve located under the Spanish laws and measure about 950 feet by 600 feet, while thirteen were located under the mining laws of the U. S. and are 1500 feet by 600. All of the claims have some development work. One, in the "Utah" group, has a 60-foot tunnel in ore, which runs from \$10 to \$12 gold to the ton. Headquarters for the mines will be at Bagulo, in Benguet Province.

Army officers at Washington, D. C., who have recently returned from Mindanao say that the valleys of the river Sita and its tributaries, with a total length of 200 or 300 miles, are gold-bearing. The natives with rude washing implements are said to clean up from 50 cents to \$3 worth of gold in a day. The officers have brought back specimens of this gold and report that, according to the natives, it is found all through the valleys, which range from 5 to 20 miles in width. They say no American miners have as yet gone into the region.

#### FOREIGN.

##### BRITISH COLUMBIA.

It is reported from Horse Fly, in Cariboo district, that rich placer ground has been struck near the headwaters of Horse Fly creek, in a section where no white men have ever explored before.

The nickel ore on Wild Horse creek, near Fort Steele, is silver-gray in color and carries arsenic and antimony. It is understood that the work done on the Grace Dore ledge has uncovered the ledge for about 40 feet.

J. Breen, D. Fotheringham and H. Bellinger, Supt. Heinz smelters at Butte, Mont., have completed plans for building a 300-ton smelter on the east coast of Vancouver island, 40 miles north of Victoria. Two stacks will be constructed at the start, and plans will be made for increasing the capacity as the ore supply increases. H. Bellinger will be manager. Work will be commenced at once.

A strike has been made in the Aurora mine, near Moyie. A shaft being sunk on the ore body shows the vein widened out to 7 feet of solid galena. The mine is owned by Rader, Sanborn & Johnson.

A strike has been made at the head of Springer creek, in the Slokan, on the Monterey group, owned by N. F. McNaught, R. Milloy and L. Doiron. The discovery, made in an open cut, consists of a 6-foot ledge, carrying two pay streaks, 4 and 8 inches wide. The smaller streak assays from 410 to 500 ounces silver and the larger 80 ounces silver to the ton.

The tunnel on the Tammany group in the Burnt Basin, near Grand Forks, has crossed a blind ledge 9 feet wide. The ore is free milling. Development work is in charge of B. Rea. The Tammany group is owned by Saginaw, Mich., men.

S. H. Miner, president of the Granby Con. M. & S. Co., is reported as stating that the company is adopting what is known as the caveing system, which hitherto has not been applied to copper mining, but which is the method used in iron mining in Michigan and Minnesota. By means of large open cuts in a mountain of ore the latter is broken down and loaded upon the cars with steam shovels, obviating all timbering and pumping, and reducing to a minimum the cost of handling the whole mass. He claims that the company's smelting plant is treating ores at less cost than any other smelting plant in the world and anticipates beating its present record by at least 25%, with a more complete equipment and with the increased quantity of ore handled.

A record run for a single-blast furnace has been made at Greenwood, where the plant put through 484 tons during twenty-four hours. Of this amount 432 tons was ore and the balance coke. The furnace of the British Columbia Copper Co. was built with a nominal capacity to treat 225 tons daily; but, owing to the self-fluxing character of the ore, the daily average comes nearer 390 tons. P. Johnson, the manager of the smelter department, believes that the run establishes a world's record in blast-furnace work.

##### CHILI.

A shipment of silver ore from Chili has been received at the Pueblo smelter. It is one of the largest cargoes of silver ore recorded, being in 58,095 sacks, which required 215 cars to transport from Galveston, Tex., to Pueblo, Colo. There were 4800 tons, and the duty was \$30 a ton. The ore ran \$700 to the ton. The railroad freight charges were \$60,000.

##### KLONDIKE.

There have been heavy demands for mining machinery on the claims this summer. New lines of railroad are projected from Dawson to open up the country lying between Indian river and Quartz creek. All of the streams in this vicinity are said to be extremely rich.

#### MEXICO.

In September there were smelted at the Greene Con. Copper Co.'s mines at La Cananea, Sonora, 24,880,000 pounds of ore, producing 3,834,000 pounds of matte, containing 1,860,000 pounds copper. The average price received for copper sold during the month was 15.87 cents. New smelters will be blown in during October, which will increase the daily capacity 300 tons per day. The railroad is now operated to Villa Verde and all coke and other supplies are being shipped there by rail. The broad gauge railroad is expected to be completed to the mines about Nov. 25.

#### Personal.

J. ROSS, JR., of Sutter Creek, Cal., is looking at mines in Trinity county, Cal.

F. EDISON has resigned as Supt. of the West Century M. Co. at Park Valley, Utah.

T. W. FOSTER, M. E., late of Redding, Shasta Co., Cal., is sojourning in San Francisco.

W. V. MILLER has resigned as superintendent of the California Ophir mine at Angels, Cal.

J. RALPH, of Butte, Mont., has been appointed manager of the Oro Fino M. Co. near Prescott, Ariz.

F. T. CALEY has been elected manager of the Atlantic Mines Co., operating at Cripple Creek, Colo.

E. A. DE HAVEN, superintendent of the Wild Cat mine, near Carters, Tuolumne county, is in San Francisco.

J. A. KIRBY, manager of the Daly-West mine at Park City, Utah, has returned there from Tonopah, Nev.

H. A. KELLER, manager of the Trinity Copper Co., at Redding, Cal., has returned there from Boston, Mass.

JERRY LYNCH has returned to San Francisco, Cal., from the Klondike, where he has been mining for several years.

C. W. GOODELL, manager of the Great Falls smelter of the Boston & Montana Co., at Butte, Mont., is in Clifton, Ariz.

L. C. MOTT has been appointed Supt. of the Pinal Copper Co. at Globe, Ariz. G. P. Andrews, manager of this company, will make his headquarters at St. Louis.

F. T. SNYDER, E. M., of Chicago, Ill., is sojourning in San Francisco, coming here from a professional trip in Athabaska river country, Canada.

H. C. HOOVER, M. E., is in San Francisco, Cal., en route to England from China, where he has been engaged for three years examining the gold and coal deposits of that country.

#### Recently Declared Mining Dividends.

|                                      | Payable. |
|--------------------------------------|----------|
| New Home M. Co., Colo., monthly,     |          |
| 1 cent per share, \$12,500.....      | Oct. 20  |
| Gold Coin M. & L. Co., Colo.,        |          |
| monthly, 3 cents per share,          |          |
| \$30,000.....                        | Oct. 21  |
| Con. Mines Co., Colo., monthly, 1    |          |
| cent per share, \$19,000.....        | Oct. 21  |
| New Zealand M. Co., Colo.,           |          |
| monthly, 1 cent per share,           |          |
| \$7650.....                          | Oct. 21  |
| Homestake M. Co., S. D., monthly,    |          |
| 25 cents per share and 25 cents      |          |
| extra.....                           | Oct. 25  |
| Vindicator M. Co., Colo., quarterly, |          |
| 3 cents per share and extra          |          |
| 2 cents, \$55,000.....               | Oct. 25  |
| Butterfly-Terrible M. Co., Colo.,    |          |
| quarterly, 1 cent per share,         |          |
| \$6250.....                          | Oct. 28  |
| Town Topics M. Co., Colo., 1 cent    |          |
| per share, \$5000.....               | Nov. 1   |
| Stratton's Independence, Colo.,      |          |
| quarterly, 24 cents per share,       |          |
| \$240,000.....                       | Oct. 24  |
| Pacific Coast Borax Co., Cal.,       |          |
| monthly, \$1 per share, \$19,000.... | Oct. 30  |
| Aberdeen C. M. Co., N. M., \$1 per   |          |
| share, \$32,175.....                 | Nov. 4   |
| Standard S. M. Co., Ida., monthly,   |          |
| 5 cents per share, \$25,000.....     | Oct. 23  |
| Alaska-Treadwell M. Co., Alaska,     |          |
| quarterly, 37 1/2 cents per share,   |          |
| \$75,000.....                        | Oct. 28  |
| Ontario S. M. Co., quarterly, 30     |          |
| cents per share.....                 | Dec. 20  |

#### Catalogues Received.

THE Sullivan Machinery Co. of Chicago, Ill., has issued Catalogue No. 47 advance sheets, illustrative and descriptive of the Sullivan air compressors. It is a dozen or so attractively printed and illustrated pages, giving details and dimensions of some of their compressors, together with data to assist a mine manager in estimating on his requirements. It will be mailed on application to the Sullivan Machinery Co., 1170 West Lake St., Chicago, Ill.



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| <b>A</b>                                      |               | <b>K</b>             |    | <b>R</b>                       |      | <b>S</b>                               |    |
| Adams, W. J.                                  | 14            | Kent Mill Co.        | 5  | Rand Drill Co.                 | 9    | San Francisco Novelty & Plating Works. | 10 |
| Ainsworth & Sons, Wm.                         | 14            | Keuffel & Esser Co.  | 15 | Redington & Co.                | 2    | San Francisco Pioneer Screen Works.    | 10 |
| Altholphen Perforated Metal Co., Robert.      | 16            | Keystone Driller Co. | 17 | Rose, I. Elmer.                | 2    | Sands & Wood.                          | 14 |
| Akers, Wm. A.                                 | 14            | Knight & Co.         | 13 | Richards, J. W.                | 14   | Schaw, Ingram, Batchelor & Co.         | 14 |
| Allis-Chalmers Co.                            | 16            | Krogh Mfg. Co.       | —  | Ridson Iron Works.             | 2, 3 | School of Practical Mining.            | 14 |
| American Diamond Rock Drill Co.               | 9             |                      |    | Rix Compressed Air & Drill Co. | 9    | Selby Smelting & Lead Co.              | 14 |
| American Engineering Works.                   | 1             |                      |    | Robins Conveying Belt Co.      | 23   | S. H. Supply Co.                       | 14 |
| American Expansion Pulley Co.                 | 21            |                      |    | Roebbling's Sons Co., John A.  | 23   | Simonds, Ernest H.                     | 14 |
| American Industrial Publishing Co.            | 15            |                      |    | Roesler & Haeuser Chemical Co. | 14   | Simonds Saw Co.                        | 18 |
| American Oil & Refinery Co.                   | 2             |                      |    | Rosenberger, A. F.             | 23   | Situations Wanted.                     | 2  |
| American Steel & Wire Co.                     | 2             |                      |    |                                |      | Smith Co., S. Morgan.                  | 20 |
| Assessment Notices.                           | 2             |                      |    |                                |      | Smith & Co., Francis.                  | 7  |
| Atlas Pipe Wrench Co.                         | 19            |                      |    |                                |      | Smith & Thompson.                      | 21 |
| <b>B</b>                                      |               |                      |    |                                |      | Smooth-On Mfg. Co.                     | 14 |
| Baird & Co., Henry Carey.                     | 16            |                      |    |                                |      | Standard Oil Co.                       | 2  |
| Baker & Co.                                   | 14            |                      |    |                                |      | State Ore Sampling Co.                 | 16 |
| Baker & Hamilton.                             | 18, 21        |                      |    |                                |      | Stevens, Ralph E.                      | 14 |
| Baker Iron Works.                             | 16            |                      |    |                                |      | Stillwell-Bierco & Smith-Valle Co.     | 14 |
| Bayer, G. D.                                  | 14            |                      |    |                                |      | Stockton Business College.             | 14 |
| Barnhart, Geo. W.                             | 19            |                      |    |                                |      | Strout & Son, W. H.                    | 14 |
| Bartlett & Co., C. O.                         | 19            |                      |    |                                |      | Sturtevant Mill Co.                    | 12 |
| Bauer Lamp & Reflector Co.                    | 2             |                      |    |                                |      | Sullivan Machinery Co.                 | 9  |
| Becker, Christian.                            | 15            |                      |    |                                |      |                                        |    |
| Bell, Newton M.                               | 19            |                      |    |                                |      |                                        |    |
| Benjamin, E. H.                               | 14            |                      |    |                                |      |                                        |    |
| Best Manufacturing Co.                        | 3             |                      |    |                                |      |                                        |    |
| Billing & Co., Chas. E.                       | 2             |                      |    |                                |      |                                        |    |
| Boesch Lamp Co.                               | 7             |                      |    |                                |      |                                        |    |
| Bradley Pulverizer Co.                        | 7             |                      |    |                                |      |                                        |    |
| Braun & Co., F. W.                            | 5             |                      |    |                                |      |                                        |    |
| Bretherton Hot Blast Smelting Co.             | 19            |                      |    |                                |      |                                        |    |
| Broderick & Batcom Rope Co.                   | 4             |                      |    |                                |      |                                        |    |
| Brownell, J. S.                               | —             |                      |    |                                |      |                                        |    |
| Burgoyne Dredge.                              | 11            |                      |    |                                |      |                                        |    |
| Burlingame & Co., E. B.                       | 11            |                      |    |                                |      |                                        |    |
| Burnham-Standford Co.                         | 16            |                      |    |                                |      |                                        |    |
| Burt Mfg. Co.                                 | 1             |                      |    |                                |      |                                        |    |
| Burton, Howard E.                             | 1             |                      |    |                                |      |                                        |    |
| <b>C</b>                                      |               |                      |    |                                |      |                                        |    |
| California Debris Commission.                 | 2             |                      |    |                                |      |                                        |    |
| California Dredging Co.                       | 2             |                      |    |                                |      |                                        |    |
| California Electrical Works.                  | 2             |                      |    |                                |      |                                        |    |
| California Perforating Screen Co.             | 16            |                      |    |                                |      |                                        |    |
| California Vigorite Powder Co.                | 16            |                      |    |                                |      |                                        |    |
| California Wire Works.                        | 22            |                      |    |                                |      |                                        |    |
| Cameron Steam Pump Works.                     | 13            |                      |    |                                |      |                                        |    |
| Canton Steel Co.                              | 9             |                      |    |                                |      |                                        |    |
| Cary Spring Works.                            | 13            |                      |    |                                |      |                                        |    |
| Chinn-Beretta Optical Co.                     | 2             |                      |    |                                |      |                                        |    |
| Chrome Steel Works.                           | 20            |                      |    |                                |      |                                        |    |
| Clot & Crist Machine Co.                      | 11            |                      |    |                                |      |                                        |    |
| Colorado Iron Works Co.                       | 11, 12        |                      |    |                                |      |                                        |    |
| Colorado Lamp Co.                             | 10            |                      |    |                                |      |                                        |    |
| Colorado Midland Railway.                     | 10            |                      |    |                                |      |                                        |    |
| Colorado & Southern Railway.                  | 10            |                      |    |                                |      |                                        |    |
| Cooper, C. A.                                 | 14            |                      |    |                                |      |                                        |    |
| Copper King, Ltd.                             | 14            |                      |    |                                |      |                                        |    |
| Cory, C. L.                                   | 14            |                      |    |                                |      |                                        |    |
| Crocker.                                      | 17, 21        |                      |    |                                |      |                                        |    |
| Crocker-Wheeler Co.                           | 20            |                      |    |                                |      |                                        |    |
| Currie, J. W.                                 | 14            |                      |    |                                |      |                                        |    |
| <b>D</b>                                      |               |                      |    |                                |      |                                        |    |
| Davis Iron Works Co., F. M.                   | 12            |                      |    |                                |      |                                        |    |
| Deane Drug & Chemical Works.                  | 15            |                      |    |                                |      |                                        |    |
| Dennison's San Francisco Plating Works.       | 8             |                      |    |                                |      |                                        |    |
| Denver Engineering Works.                     | 16            |                      |    |                                |      |                                        |    |
| Denver Fire Clay Co.                          | 15            |                      |    |                                |      |                                        |    |
| Denver & Rio Grande R. R.                     | 16            |                      |    |                                |      |                                        |    |
| <b>E</b>                                      |               |                      |    |                                |      |                                        |    |
| Deasau, S.                                    | 9             |                      |    |                                |      |                                        |    |
| Detroit Leather Specialty Co.                 | 10            |                      |    |                                |      |                                        |    |
| Detroit Lubricator Co.                        | 19            |                      |    |                                |      |                                        |    |
| Dewey, Strong & Co.                           | 8, 10, 12, 16 |                      |    |                                |      |                                        |    |
| Doble Co., Abner.                             | 14            |                      |    |                                |      |                                        |    |
| Dob's & Hicks.                                | 8             |                      |    |                                |      |                                        |    |
| Donaldson & Co., A. M.                        | 2             |                      |    |                                |      |                                        |    |
| Dow Pumping Engine Co., Geo. E.               | —             |                      |    |                                |      |                                        |    |
| <b>F</b>                                      |               |                      |    |                                |      |                                        |    |
| Eby, Jno. D.                                  | —             |                      |    |                                |      |                                        |    |
| Edson Manufacturing Co.                       | 7             |                      |    |                                |      |                                        |    |
| Electric Wheel Co.                            | 14            |                      |    |                                |      |                                        |    |
| Electric, Railway & Mfrs Supply Co.           | 2             |                      |    |                                |      |                                        |    |
| Elcasso Telephone Co.                         | 2             |                      |    |                                |      |                                        |    |
| Eureka Co.                                    | 2             |                      |    |                                |      |                                        |    |
| Evans & Co., C. H.                            | 2             |                      |    |                                |      |                                        |    |
| Excelsior Redwood Co.                         | 8             |                      |    |                                |      |                                        |    |
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| Falkenau, Louis.                              | 14            |                      |    |                                |      |                                        |    |
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| Finn, Oliver B.                               | 19            |                      |    |                                |      |                                        |    |
| Florence & Cripple Creek Railroad Co.         | 2             |                      |    |                                |      |                                        |    |
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| Fowler, G. C.                                 | 2             |                      |    |                                |      |                                        |    |
| Fraser, E. J.                                 | 19            |                      |    |                                |      |                                        |    |
| Freder & Son.                                 | 19            |                      |    |                                |      |                                        |    |
| G. V. Young & Co.                             | 14            |                      |    |                                |      |                                        |    |
| Gulda Tank Manufactory.                       | —             |                      |    |                                |      |                                        |    |
| <b>H</b>                                      |               |                      |    |                                |      |                                        |    |
| Gardner Electric Drill & Machinery Co.        | 8             |                      |    |                                |      |                                        |    |
| Garlock Packing Co.                           | 21            |                      |    |                                |      |                                        |    |
| General Concentrates Co.                      | 20            |                      |    |                                |      |                                        |    |
| General Electric Co.                          | 5             |                      |    |                                |      |                                        |    |
| Globe Iron Works.                             | 5             |                      |    |                                |      |                                        |    |
| Goodyear Rubber Co.                           | 15            |                      |    |                                |      |                                        |    |
| Gold & Silver Extraction Co. of America, Ltd. | 15            |                      |    |                                |      |                                        |    |
| Grimm, Frank W.                               | 11            |                      |    |                                |      |                                        |    |
| Gutta Percha Rubber & Mfg. Co.                | —             |                      |    |                                |      |                                        |    |
| <b>I</b>                                      |               |                      |    |                                |      |                                        |    |
| Ingersoll-Sergeant Drill Co.                  | 2             |                      |    |                                |      |                                        |    |
| Irving & Co., James.                          | 8             |                      |    |                                |      |                                        |    |
| <b>J</b>                                      |               |                      |    |                                |      |                                        |    |
| Jackson Drill & Mfg. Co.                      | 9             |                      |    |                                |      |                                        |    |
| Jackson Machine Works, BYRON.                 | 8             |                      |    |                                |      |                                        |    |
| Jeffrey Mfg. Co., The.                        | 17            |                      |    |                                |      |                                        |    |
| Jeanesville Iron Works Co.                    | 9             |                      |    |                                |      |                                        |    |
| Jessop & Sons, Ltd., Wm.                      | 9             |                      |    |                                |      |                                        |    |
| <b>K</b>                                      |               |                      |    |                                |      |                                        |    |
| Kent Mill Co.                                 | 5             |                      |    |                                |      |                                        |    |
| Keuffel & Esser Co.                           | 15            |                      |    |                                |      |                                        |    |
| Keystone Driller Co.                          | 17            |                      |    |                                |      |                                        |    |
| Knight & Co.                                  | 13            |                      |    |                                |      |                                        |    |
| Krogh Mfg. Co.                                | —             |                      |    |                                |      |                                        |    |
| <b>L</b>                                      |               |                      |    |                                |      |                                        |    |
| Lefel & Co., James.                           | 13            |                      |    |                                |      |                                        |    |
| Legg, R. G.                                   | 14            |                      |    |                                |      |                                        |    |
| Leschen, A. & Sons.                           | 10            |                      |    |                                |      |                                        |    |
| Lewellyn Iron Works.                          | 9             |                      |    |                                |      |                                        |    |
| Leyner, J. Geo.                               | 2             |                      |    |                                |      |                                        |    |
| Lietz Co., A.                                 | 14            |                      |    |                                |      |                                        |    |
| Link-Belt Machinery Co.                       | 16            |                      |    |                                |      |                                        |    |
| "Locomobile" Company of the Pacific.          | —             |                      |    |                                |      |                                        |    |
| Luckhardt Co., C. A.                          | 14            |                      |    |                                |      |                                        |    |
| Lunkenhelm Co.                                | 19            |                      |    |                                |      |                                        |    |
| <b>M</b>                                      |               |                      |    |                                |      |                                        |    |
| Macbeth & Co., James.                         | 16            |                      |    |                                |      |                                        |    |
| Macdonald, Bernard.                           | 14            |                      |    |                                |      |                                        |    |
| Madison, Bruce & Sellers.                     | 14            |                      |    |                                |      |                                        |    |
| Main Belting Co.                              | 17            |                      |    |                                |      |                                        |    |
| Manning's Assay Office.                       | 2             |                      |    |                                |      |                                        |    |
| Marion Steam Shovel Co.                       | 20            |                      |    |                                |      |                                        |    |
| Marshutz & Cantrell.                          | 20            |                      |    |                                |      |                                        |    |
| McFarland & Co.                               | 19            |                      |    |                                |      |                                        |    |
| Meridith & W.                                 | 14            |                      |    |                                |      |                                        |    |
| Michigan College of Mines.                    | 12            |                      |    |                                |      |                                        |    |
| Midland Terminal Railway Co.                  | 7             |                      |    |                                |      |                                        |    |
| Midvale Steel Co.                             | 10            |                      |    |                                |      |                                        |    |
| Mine & Smelter Supply Co.                     | 7             |                      |    |                                |      |                                        |    |
| Miners' Assay Office.                         | 14            |                      |    |                                |      |                                        |    |
| "Mining Investor"                             | 12            |                      |    |                                |      |                                        |    |
| Montag & Co., W. W.                           | 12            |                      |    |                                |      |                                        |    |
| Moore & Co., Chas. C.                         | 17            |                      |    |                                |      |                                        |    |
| Morris, H. D. & H. W.                         | 20            |                      |    |                                |      |                                        |    |
| <b>N</b>                                      |               |                      |    |                                |      |                                        |    |
| National Iron Works.                          | 20            |                      |    |                                |      |                                        |    |
| Neill, James W.                               | 14            |                      |    |                                |      |                                        |    |
| Nevada Metallurgical Works.                   | 14            |                      |    |                                |      |                                        |    |
| New Era Machinery Co.                         | 17            |                      |    |                                |      |                                        |    |
| New Process Raw Hide Co.                      | —             |                      |    |                                |      |                                        |    |
| <b>O</b>                                      |               |                      |    |                                |      |                                        |    |
| Ogden Assay Co.                               | 14            |                      |    |                                |      |                                        |    |
| Oregon Short Line Railroad.                   | 15            |                      |    |                                |      |                                        |    |
| Oriental Gas Engine Co.                       | —             |                      |    |                                |      |                                        |    |
| Otis, McAllister & Co.                        | —             |                      |    |                                |      |                                        |    |
| <b>P</b>                                      |               |                      |    |                                |      |                                        |    |
| Pacific Coast Rubber Co.                      | 8             |                      |    |                                |      |                                        |    |
| Pacific Coast Smelting & Refining Works.      | 4             |                      |    |                                |      |                                        |    |
| Pacific Engineering Co.                       | 14            |                      |    |                                |      |                                        |    |
| Pacific Tank Co.                              | 12            |                      |    |                                |      |                                        |    |
| Paraffine Paint Co.                           | 18            |                      |    |                                |      |                                        |    |
| Parker & Lacy Co.                             | 22            |                      |    |                                |      |                                        |    |
| Paul Almarin B.                               | 14            |                      |    |                                |      |                                        |    |
| Pennington Sons, Inc., Geo. W.                | 21            |                      |    |                                |      |                                        |    |
| Perez, Richard A.                             | 14            |                      |    |                                |      |                                        |    |
| Peterson, L.                                  | 2             |                      |    |                                |      |                                        |    |
| Phillips & Co., Alvin.                        | 14            |                      |    |                                |      |                                        |    |
| Phillips Rock Drill Co.                       | 9             |                      |    |                                |      |                                        |    |
| Phoenix Cyanide Process Co.                   | 17            |                      |    |                                |      |                                        |    |
| Pfelethwaite, R. H.                           | 14            |                      |    |                                |      |                                        |    |
| Powell Co., Wm.                               | 19            |                      |    |                                |      |                                        |    |
| Prescott & Eastern Railroad.                  | 10            |                      |    |                                |      |                                        |    |
| Putman, H. J. & Co.                           | 18            |                      |    |                                |      |                                        |    |
| <b>Q</b>                                      |               |                      |    |                                |      |                                        |    |
| Quick, Jno. W.                                | 16            |                      |    |                                |      |                                        |    |
| <b>R</b>                                      |               |                      |    |                                |      |                                        |    |
| Rand Drill Co.                                | 9             |                      |    |                                |      |                                        |    |
| Redington & Co.                               | 2             |                      |    |                                |      |                                        |    |
| Rose, I. Elmer.                               | 2             |                      |    |                                |      |                                        |    |
| Richards, J. W.                               | 14            |                      |    |                                |      |                                        |    |
| Ridson Iron Works.                            | 2, 3          |                      |    |                                |      |                                        |    |
| Rix Compressed Air & Drill Co.                | 9             |                      |    |                                |      |                                        |    |
| Robins Conveying Belt Co.                     | 23            |                      |    |                                |      |                                        |    |
| Roebbling's Sons Co., John A.                 | 23            |                      |    |                                |      |                                        |    |
| Roesler & Haeuser Chemical Co.                | 14            |                      |    |                                |      |                                        |    |
| Rosenberger, A. F.                            | 23            |                      |    |                                |      |                                        |    |
| <b>S</b>                                      |               |                      |    |                                |      |                                        |    |
| San Francisco Novelty & Plating Works.        | 10            |                      |    |                                |      |                                        |    |
| San Francisco Pioneer Screen Works.           | 10            |                      |    |                                |      |                                        |    |
| Sands & Wood.                                 | 14            |                      |    |                                |      |                                        |    |
| Stord, Albert.                                | 14            |                      |    |                                |      |                                        |    |
| Schaw, Ingram, Batchelor & Co.                | 14            |                      |    |                                |      |                                        |    |
| School of Practical Mining.                   | 14            |                      |    |                                |      |                                        |    |
| Selby Smelting & Lead Co.                     | 14            |                      |    |                                |      |                                        |    |
| S. H. Supply Co.                              | 14            |                      |    |                                |      |                                        |    |
| Simonds, Ernest H.                            | 14            |                      |    |                                |      |                                        |    |
| Simonds Saw Co.                               | 18            |                      |    |                                |      |                                        |    |
| Situations Wanted.                            | 2             |                      |    |                                |      |                                        |    |
| Smith Co., S. Morgan.                         | 20            |                      |    |                                |      |                                        |    |
| Smith & Co., Francis.                         | 7             |                      |    |                                |      |                                        |    |
| Smith & Thompson.                             | 21            |                      |    |                                |      |                                        |    |
| Smooth-On Mfg. Co.                            | 14            |                      |    |                                |      |                                        |    |
| Standard Oil Co.                              | 2             |                      |    |                                |      |                                        |    |
| State Ore Sampling Co.                        | 16            |                      |    |                                |      |                                        |    |
| Stevens, Ralph E.                             | 14            |                      |    |                                |      |                                        |    |
| Stillwell-Bierco & Smith-Valle Co.            | 14            |                      |    |                                |      |                                        |    |
| Stockton Business College.                    | 14            |                      |    |                                |      |                                        |    |
| Strout & Son, W. H.                           | 14            |                      |    |                                |      |                                        |    |
| Sturtevant Mill Co.                           | 12            |                      |    |                                |      |                                        |    |
| Sullivan Machinery Co.                        | 9             |                      |    |                                |      |                                        |    |
| <b>T</b>                                      |               |                      |    |                                |      |                                        |    |
| Tanana Mining Co.                             | 2             |                      |    |                                |      |                                        |    |
| Taylor Iron & Steel Co.                       | 19            |                      |    |                                |      |                                        |    |
| Taylor & Co., P. T.                           | —             |                      |    |                                |      |                                        |    |
| Thorne Mining Co.                             | 19            |                      |    |                                |      |                                        |    |
| Trenton Iron Co.                              | 10            |                      |    |                                |      |                                        |    |
| Tyler, S. W.                                  | 14            |                      |    |                                |      |                                        |    |
| <b>U</b>                                      |               |                      |    |                                |      |                                        |    |
| Union Gas Engine Co.                          | 15            |                      |    |                                |      |                                        |    |
| Union Iron Works.                             | 2             |                      |    |                                |      |                                        |    |
| Union Photo-Engraving Co.                     | 20            |                      |    |                                |      |                                        |    |
| <b>V</b>                                      |               |                      |    |                                |      |                                        |    |
| Van Der Nallien, A.                           | 14            |                      |    |                                |      |                                        |    |
| Van Wagenen, Theo. F.                         | 14            |                      |    |                                |      |                                        |    |
| Vulcan Iron Works.                            | 13            |                      |    |                                |      |                                        |    |
| <b>W</b>                                      |               |                      |    |                                |      |                                        |    |
| Waratah Minerals Co.                          | 2             |                      |    |                                |      |                                        |    |
| Weber Gas & Gasoline Engine Co.               | 21            |                      |    |                                |      |                                        |    |
| Weigels Pipe Works.                           | —             |                      |    |                                |      |                                        |    |
| Weisbach Co.                                  | —             |                      |    |                                |      |                                        |    |
| Western Chemical Co. Mfg. Co.                 | 20            |                      |    |                                |      |                                        |    |
| Westinghouse Electric & Mfg. Co.              | 15            |                      |    |                                |      |                                        |    |
| Wetherill Separating Co.                      | 15            |                      |    |                                |      |                                        |    |
| Wigmore & Sons, John.                         | 21            |                      |    |                                |      |                                        |    |
| Willietta Mining & Milling Co.                | 2             |                      |    |                                |      |                                        |    |
| Wimmer, Geo.                                  | 16            |                      |    |                                |      |                                        |    |
| Wheeler, Earhart Sues.                        | 15            |                      |    |                                |      |                                        |    |
| Wood, Henry E.                                | 14            |                      |    |                                |      |                                        |    |
| Woodbury, Geo. E.                             | —             |                      |    |                                |      |                                        |    |
| <b>Y</b>                                      |               |                      |    |                                |      |                                        |    |
| Yawger, I. O.                                 | 9             |                      |    |                                |      |                                        |    |
| Yuba Con. Gold Mining Co.                     | 9             |                      |    |                                |      |                                        |    |



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THE CALIFORNIA DEBRIS COMMISSION, having received applications to mine by the hydraulic process from N. Gilman, in the American House Mine, at the American House, Plumas Co., to deposit tailings in a ravine below the mine; from Jas. A. Modglin, in the Old Gardiner's Point Diggins, near Port Wine, Sierra Co., to deposit tailings in Saw Mill Ravine; from the California Company, in the North Hill Placer Mine, near Milton, Calaveras Co., to deposit tailings in Rich Gulch; and from L. V. Left, in the Lone Star Mine, near Cromberg, Plumas Co., to deposit tailings in Jackson Creek, gives notice that a meeting will be held at Room 59, Flood Building, San Francisco, Cal., on November 11, 1901, at 1:30 P. M.

THE CALIFORNIA DEBRIS COMMISSION, having received applications to mine by the hydraulic process from the Calaveras Mining, Water & Power Co., in the Johnston and Scott Hill Mines, near San Andreas, Calaveras Co., to deposit tailings in Willow Creek; from Chas. Hilton, in the Calaveritas Hill Mine, at Calaveritas, Calaveras Co., to deposit tailings in gulches draining into O'Neill and San Antonio Creeks; and from Manuel Leal and A. Rose, in the South Honey Mine, in Yuba Co., near Bangor, to deposit tailings in South Honey Creek, gives notice that a meeting will be held in Room 59, Flood Building, San Francisco, Cal., on Oct. 28, 1901, at 1:30 P. M.



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## ASSESSMENT NOTICES.

THE CALIFORNIA DREDGING COMPANY.—Principal place of business, 120 Sutter Street, San Francisco, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 22nd day of October, 1901, an assessment (No. 5) of \$10 per share was levied upon the capital stock of the corporation, payable immediately in gold coin, to the secretary of the corporation, at the office of the company, 120 Sutter Street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on MONDAY, the 25th day of November, 1901, will be delinquent and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 16th day of December, 1901, to pay the delinquent assessment, together with the cost of advertising and expenses of sale.

SAM. W. CHEYNEY, Secretary, 120 Sutter Street, San Francisco, California.

AMERICAN OIL AND REFINERY COMPANY.—Location of principal place of business, San Francisco, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 21st day of October, 1901, an assessment of five (5) cents per share was levied upon all the subscribed capital stock of the said corporation, payable immediately to J. C. Anthony, secretary of said corporation, at its office, at room No. 323 of the Parrott building, Nos. 825 to 855 Market Street, in the City and County of San Francisco, State of California.

Any stock upon which this assessment shall remain unpaid on the 26th day of November, 1901, will be delinquent and advertised for sale at public auction; and, unless payment is made before, will be sold on MONDAY, the 23rd day of December, 1901, to pay the delinquent assessment, together with costs of advertising and expenses of sale.

By order of the Board of Directors.

J. C. ANTHONY, Secretary, Office—Room 323, Parrott building, Nos. 825 to 855 Market street, San Francisco, California.

TANANA MINING COMPANY.—LOCATION OF principal place of business, San Francisco, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 30th day of September, 1901, an assessment (No. 4) of ten cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, Room 801 of the Claus Spreckels Building, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 4th day of November, 1901, will be delinquent and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 2nd day of December, 1901, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

EDWARD H. STEARNS, Secretary, Office—Room 801 Claus Spreckels Building, San Francisco, California.

THE THORPE MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Fourth Crossing, Calaveras County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 8th day of October, 1901, an assessment (No. 11) of one (1) cent per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 632 Sacramento Street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 15th day of November, 1901, will be delinquent and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 9th day of December, 1901, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

A. F. FREY, Secretary, Office—632 Sacramento street, San Francisco, California.

YUBA CONSOLIDATED GOLD MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Nevada County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 12th day of October, 1901, an assessment (No. 4) of three cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin to the secretary, at the office of the company, Room 801 of the Claus Spreckels Building, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 15th day of November, 1901, will be delinquent and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 16th day of December, 1901, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

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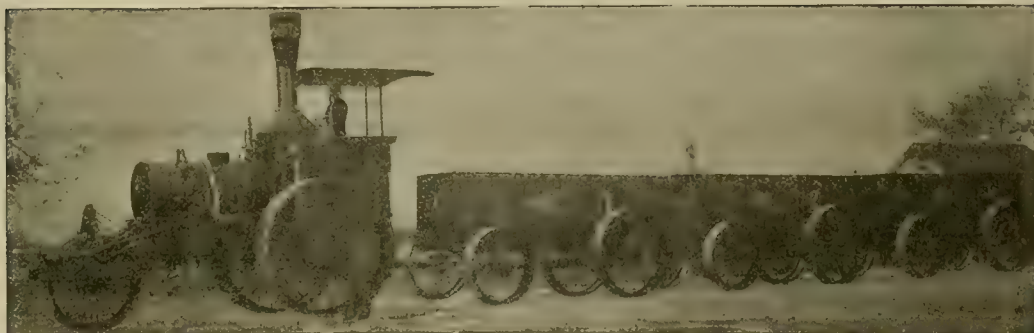


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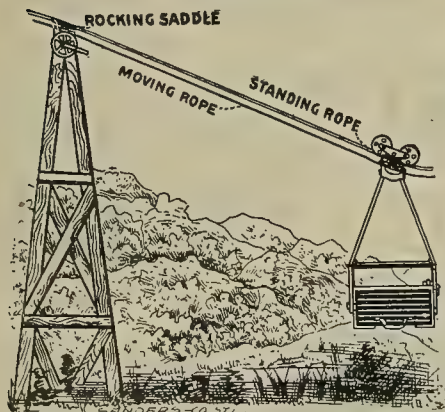
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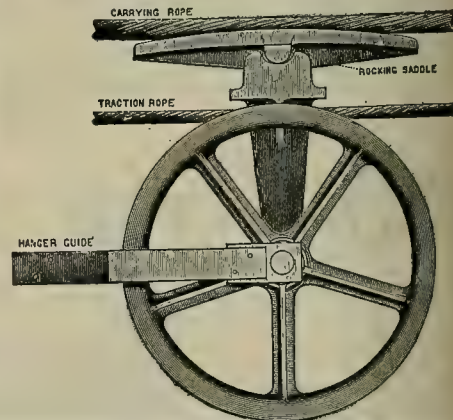
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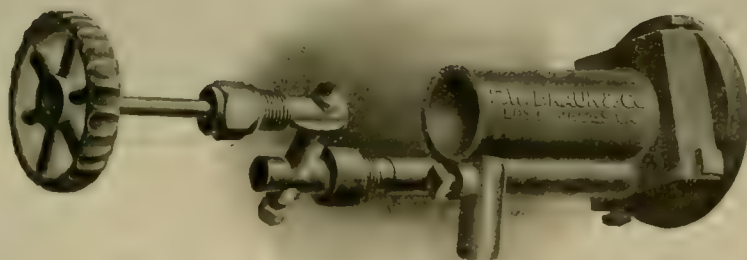
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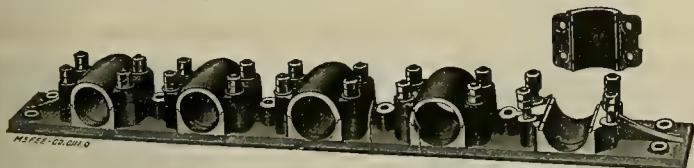
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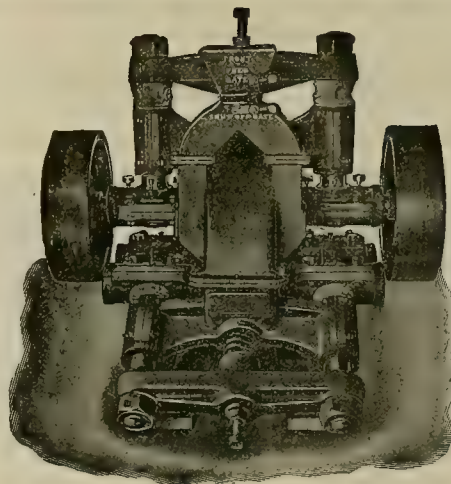
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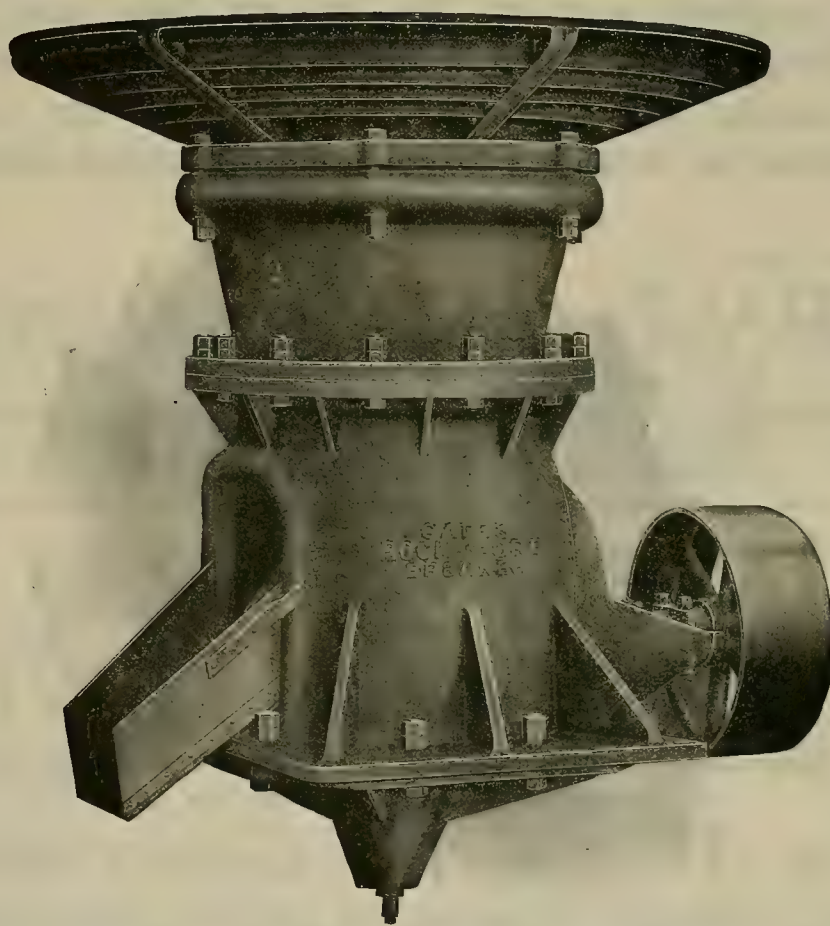
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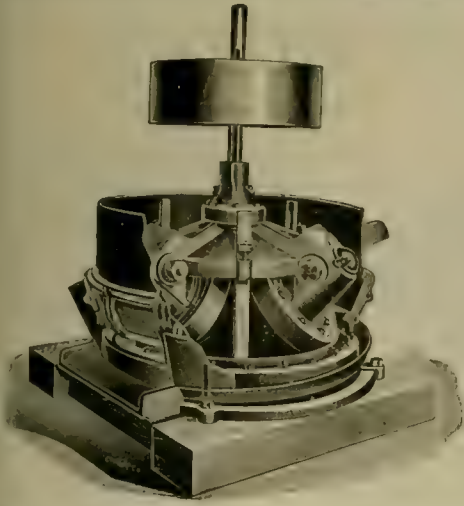
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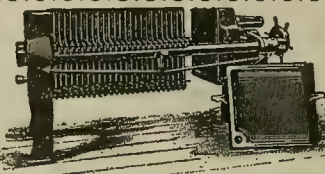
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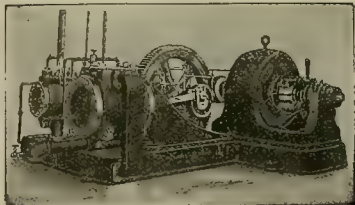
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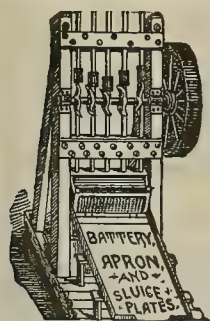
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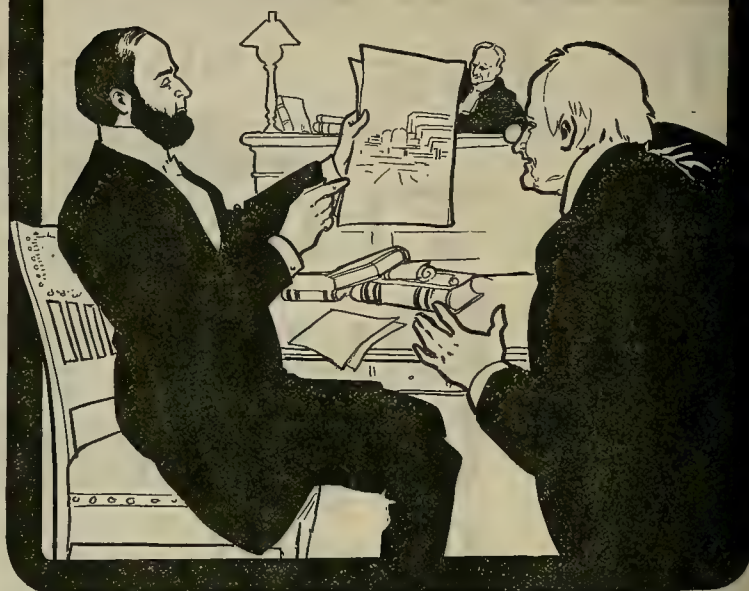
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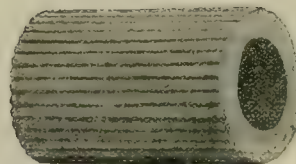
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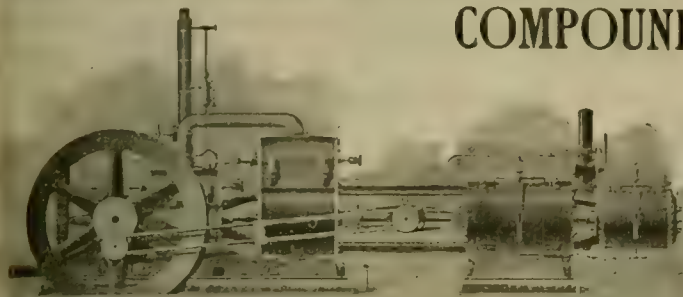
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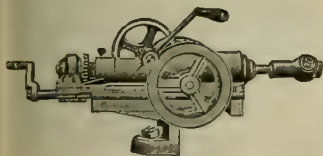
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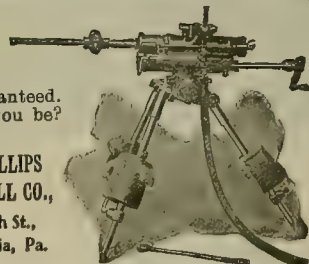
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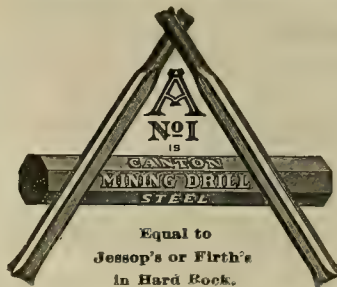


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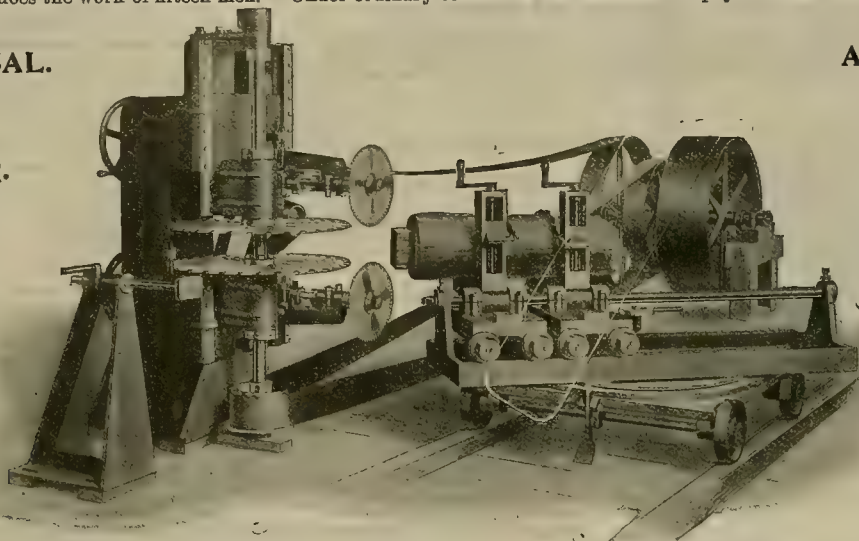
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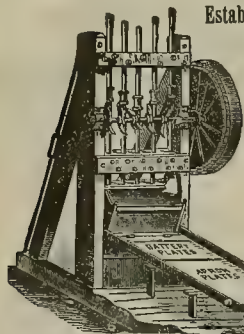
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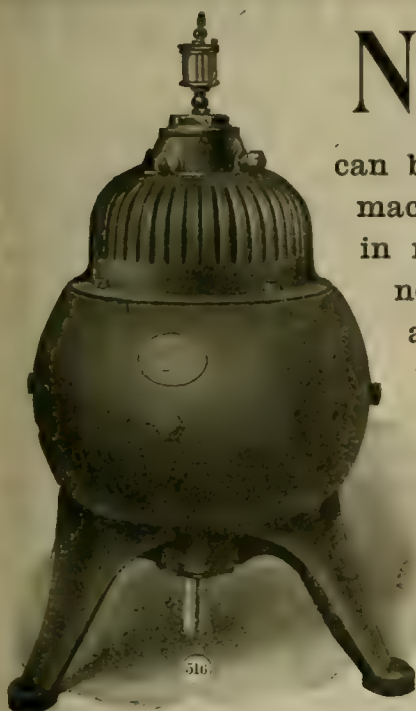


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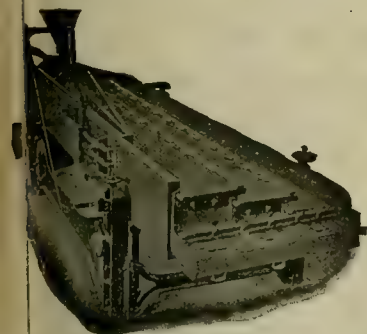
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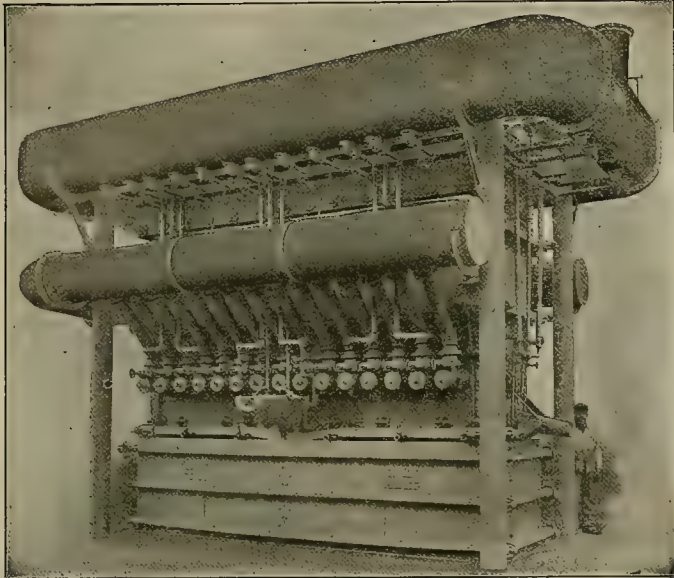
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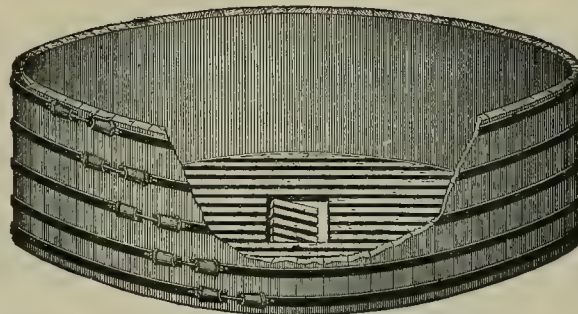
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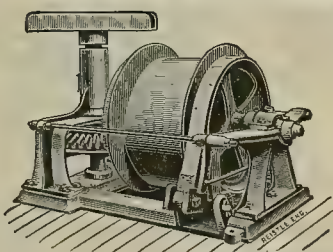
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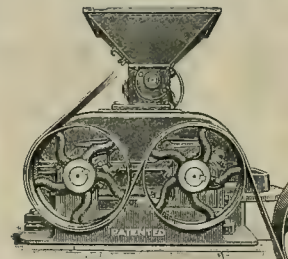
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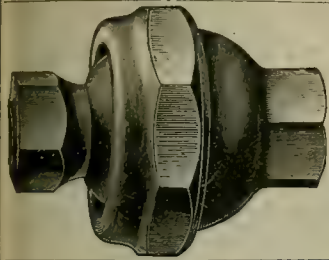
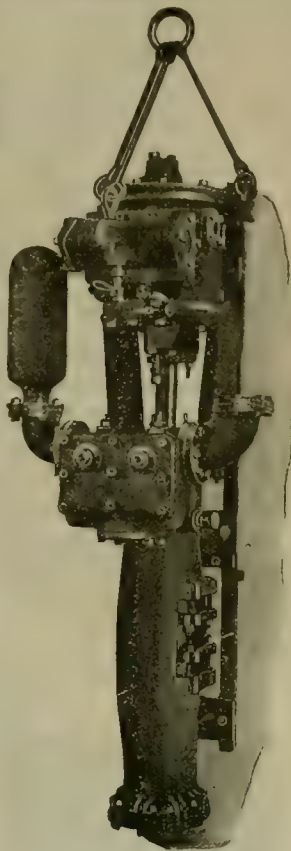
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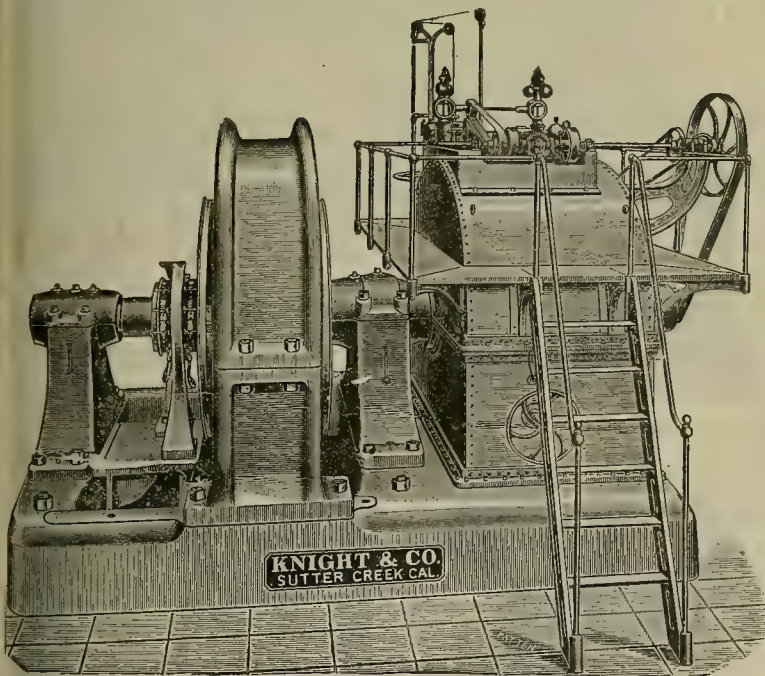
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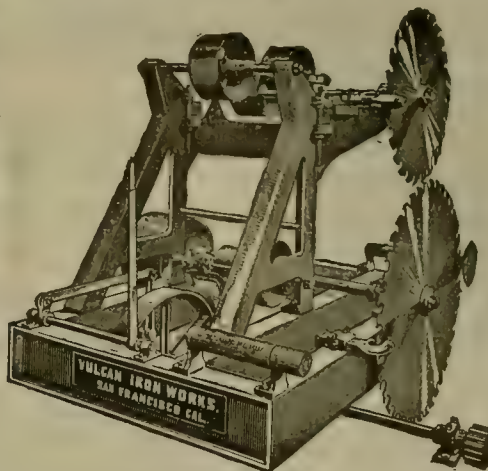
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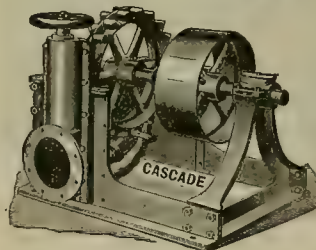
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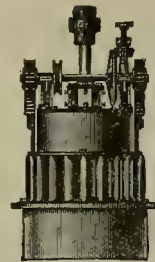
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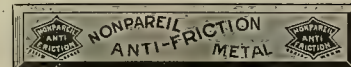
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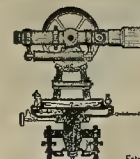
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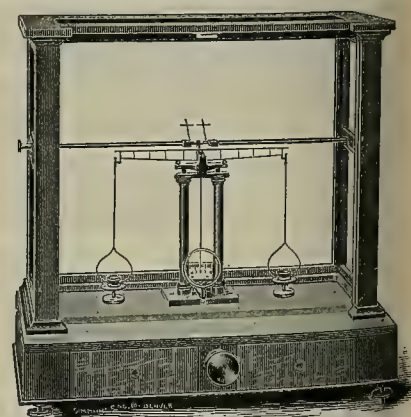
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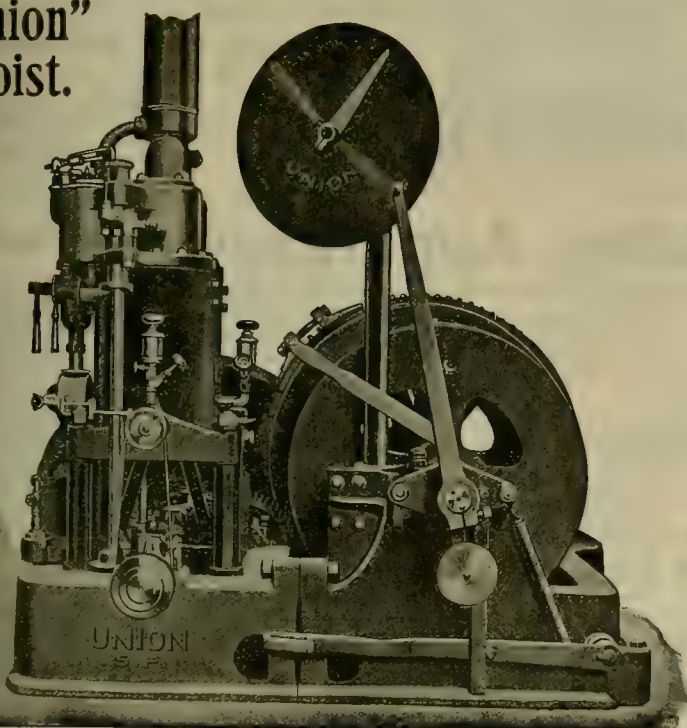
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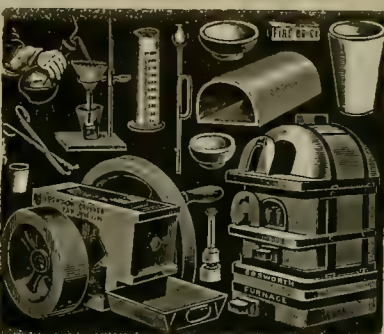
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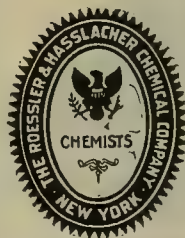
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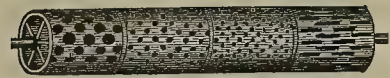


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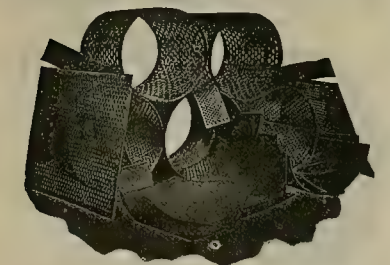
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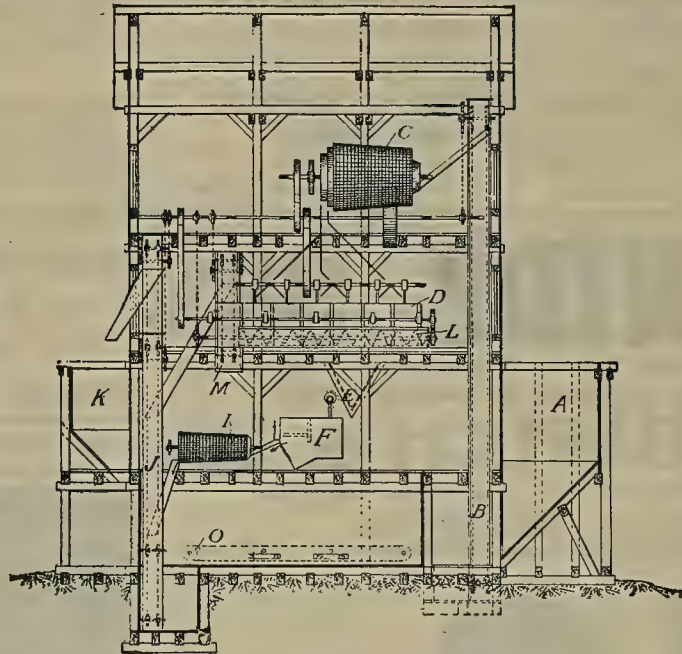
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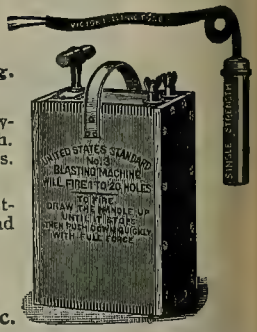
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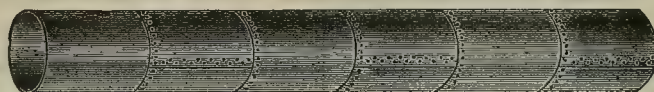
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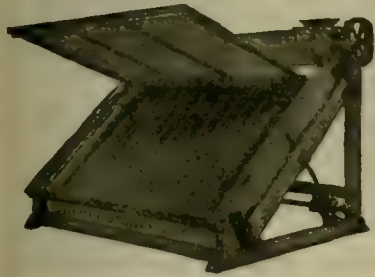
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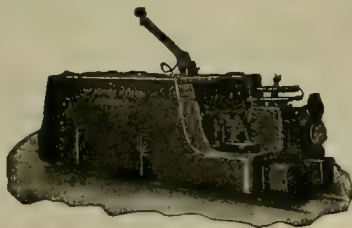
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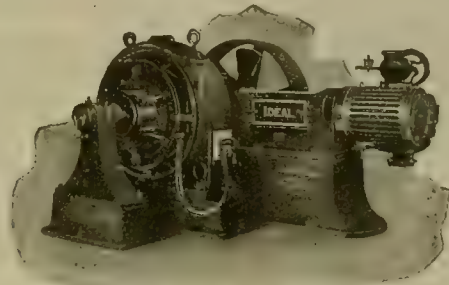
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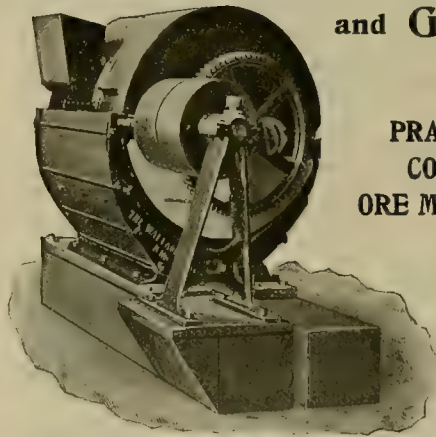
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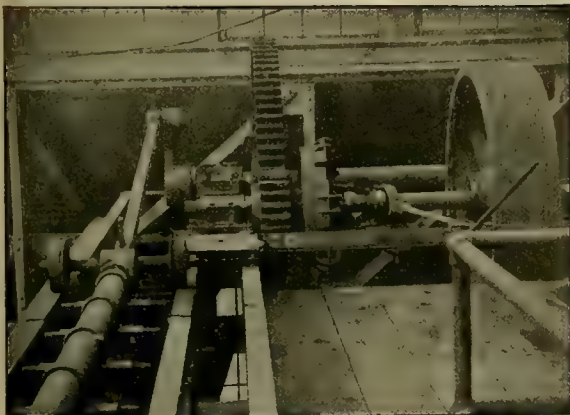
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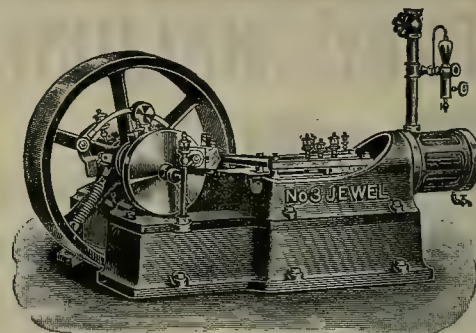
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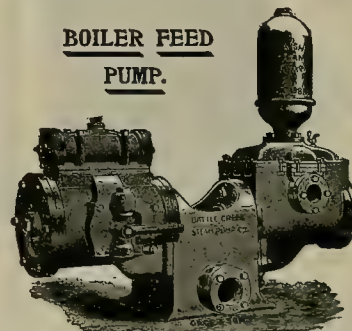


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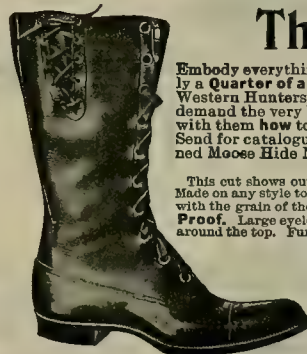
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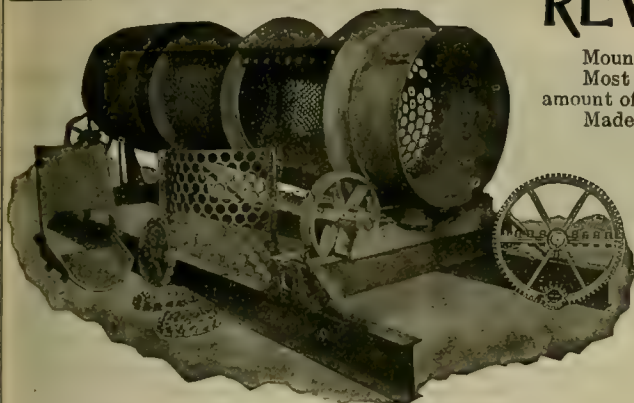
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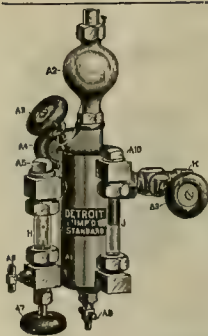
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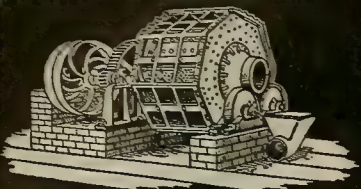
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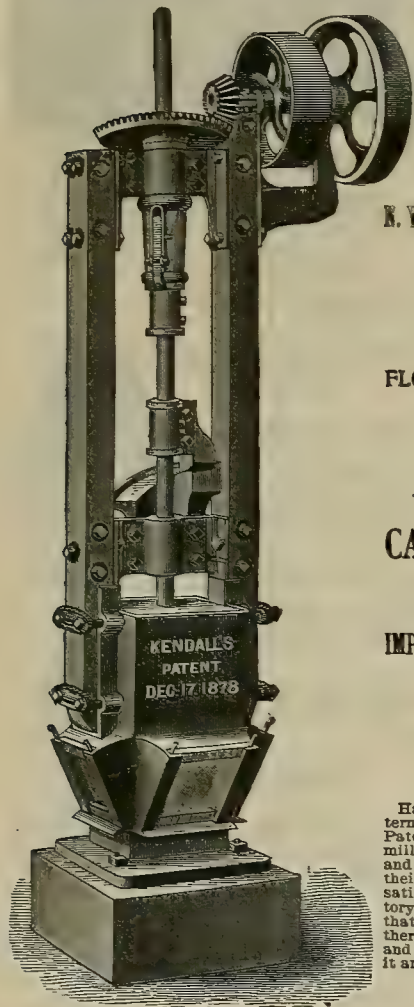
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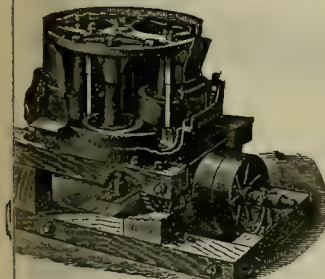
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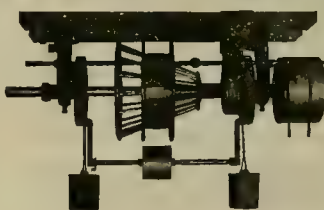
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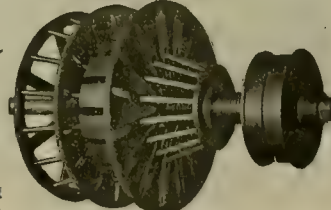


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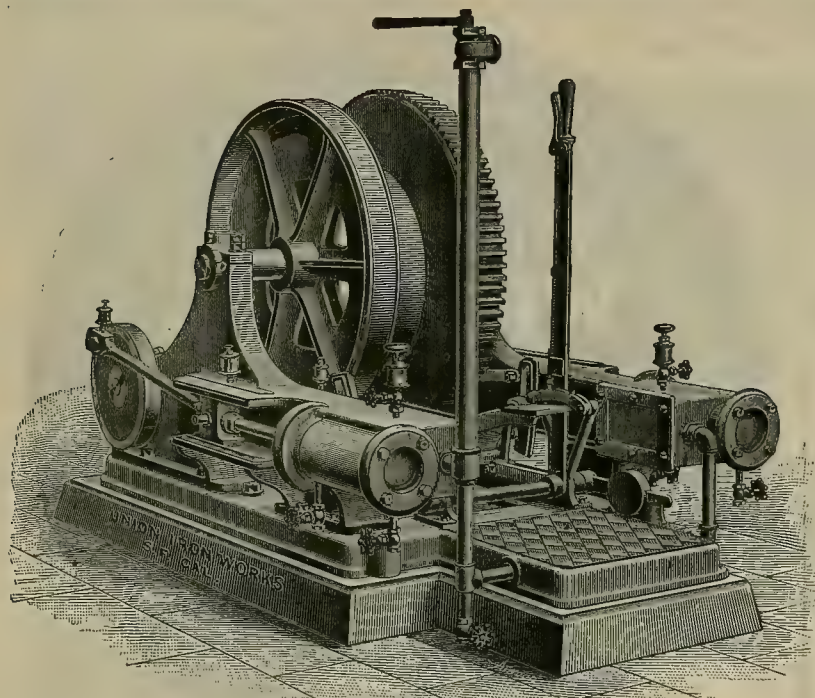


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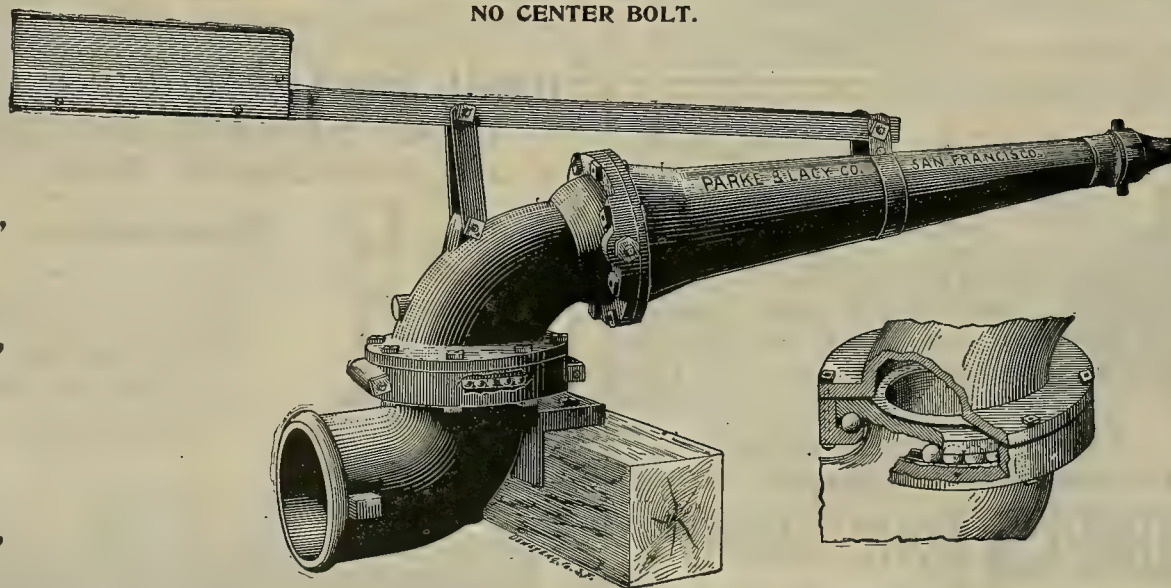
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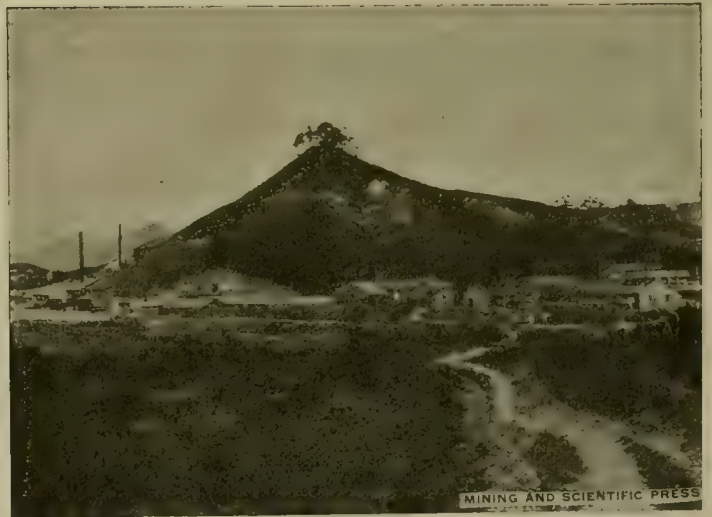
The Bund at Port of Chemulpo, Korea.



Oriental G. M. Co. Mine Boarding House and Offices at Chittabalbie, Korea.



Oriental G. M. Co. Stamp Mill at Chittabalbie, Korea.



Mill and Buildings of Oriental G. M. Co., Chittabalbie, Korea.]



Oriental G. M. Co. Hoisting Works, Tabowie, Korea.



Oriental G. M. Co. Mill at Tabowie, Korea.

(See page 182.)



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## Coke From China for Iron Smelting on Pacific Coast.

This journal in its issue of the 19th inst. editorially called attention to the commercial possibilities for iron and steel manufacture on the Pacific coast. It indicated as the source of the fuel supply China and Siberia, stating that coke could be put on board ship in those countries for \$1.50 a ton and landed at Pacific coast blast furnaces to cost not more than \$5.25 a ton. In stating the figure of \$1.50 a ton on board ship, Vladivostok in Siberia was considered as the shipping point for the coke. This place is the center of a great coal field, many of the veins being at the sea shore and other discovered beds less than 20 miles away by rail.

Since it was in print Herbert C. Hoover, a California mining engineer, a former contributor to this paper, who has been in China for three years investigating its mining resources, particularly coal, has returned to San Francisco. In the course of an interview he is credited with this statement relative to the coal resources of China and their utilization:

In coal China possesses greater resources than any other country in the world, both bituminous and anthracite. In the provinces of Shansi, Chihli and Honan there are fully 8000 square miles of horizontal beds. The bituminous coal occurs in almost every province, and in some instances is of fine coking qualities. This coal will be a factor on the Pacific coast later on, for China can supply coke landed here at a rate which will make possible the smelting of iron in California. The Chinese Engineering & Mining Co., of which I have been general manager, is operating a bituminous coking coal field in Chihli province, 60 miles from Tien-tsin, constructing a harbor at Ching Wan Tow, 70 miles from the mines, and preparing to ship coke to San Francisco, delivering it at not over \$6 a ton. Cheap labor and cheap back freights instead of ballast will make this possible. The effect on Pacific coast trade should be considerable, as there is a lack of back loading to China, and therefore high outward freight rates.

It will be noted that Mr. Hoover's statement is fully confirmatory of what this paper had already said. The difference between \$5.25 a ton and \$6 is accounted for in part by the slightly higher cost of putting the coke on board ship in China due to longer rail transportation, and the remainder by the profit margin for the coke maker, the \$5.25 figure being based on the ownership of the coal mines, coke plant and ship transportation by the iron and steel manufacturing industry establishment.

## Gold Mining in Korea.

On another page appears an exceedingly interesting description of gold mining in Korea, as inaugurated by an American company, written by a mining engineer, at the present time professionally engaged there. The illustrations that accompany the article tell the story of gold mining in that little known and, indeed, only lately known country, even better than the descriptive words. Both the matter and the illustrations present to our readers a complete and accurate statement of the new gold mining of Korea.

So little has been said about Korean gold mining during the four or five years that it has been developing, that the possible commercial importance of the industry there has been discounted wherever opinions have been expressed. As a fact, however, Korea is an exceedingly rich gold-bearing country, measured by even the high standard of comparison set by early-day gold mining of California. In 1897 the Collector of Customs at Gensan, Korea, informed the writer of this that the placer gold production of the native miners—there was no production then from the one foreign operation of mines just starting—was over \$4,000,000 a year, as indicated by the exports of the metal that were registered at the custom house.

The Korean gold mining and milling plants for gold quartz ores have another distinction, the statement of which will be somewhat of the nature of a surprise. Excepting only the gold quartz milling plants in India, the Korean plants illustrated are the first to be established in Asia. With all the exploitation of Siberian placers for a half century past, there is yet no gold quartz milling plant in that country, and no exploitation, as distinguished from prospecting, of gold quartz lodes. The first step made in Korea towards modern mining business has skipped by all the successive steps of slow advance which have evolved advanced gold mining practice, and has started the latest and the best as the beginning. The illustrations show mills and hoists, and our writer's text describes mining labor methods, in no way different from their counterparts in the United States.

The governmental conditions surrounding the industry in this new land are said to be satisfactory. There is an absence of the fussy officialism and official exploitation of foreign capital that invests in mines, that has made the establishment of American gold mining practice using either Russian or foreign capital a failure in Siberia. The Korean Government and people have, fortunately for their own material interests, encouraged and permitted the American miners, who are using American capital to exploit their gold mines, to apply without restriction American mining practice. The Korean Government and people are represented as being so satisfied with these first results of this happily-conceived policy that they would be glad to come under the political control of the United States. Considering the mutually advantageous commercial and industrial relations that citizens of the United States are fast developing from the exploitation of Korea without exploiting its people, it is certainly worth while to our country to act politically so as to maintain the conditions which permit the existence and increase of the American system.

## "Average" and "Mean" Costs.

The statement that the average cost of production of copper is about 9 cents a pound appears frequently in discussions of copper production as a basis for the conclusions of the writers. The statement is not true, unless by a most liberal construction of words it can be held half true. The fact is that there is no such thing as an "average" cost of production of copper. There is a "mean" of costs of copper production, which is about 9 cents a pound. Average and mean, as used in this relation, have not the same meaning and cannot be used as equivalents. The use of the word "average" carries with it the inference to the mind of a reader who is not technically familiar with the arts of copper mining and metallurgy that the physical limitations of these arts determine the costs of production, whereas they do not. A reader technically familiar with the arts is not misled into this inference; but the publications in which the

statement appears are the principal source of information of the non-technical reader, whose interest is, if any, that of an investor seeking profit. The constant reiteration of the misleading statement induces with such its acceptance as true, and its use as a guide to investment. The word "mean" used in connection with the "costs of production," not "cost of production," implies just what it says. It is the mean cost of all the different costs of production. With copper selling at 17 cents a pound, the cost of production is from some operations as low as 2 or 3 cents and as high as 15 or 16 cents. The mean is about 9 cents. With copper selling at 10 cents a pound, the cost of production from some operations would still be as low as 2 or 3 cents, but only as high as 8 or 9 cents with the mean of costs about 6 or 7 cents. It is unthinkable that copper will be produced at a cost greater than the market selling price. The statement, then, that the "average" cost of production of copper is 9 cents, does not mean that at all. When for it is substituted the words which do say what it means, the expression becomes meaningless as the basis of conclusions. The cost per pound of copper production is determined by first deducting from the costs of mining, metallurgical treatment and transportation to market of one average-value ton of the copper ore mined, the net sale value of the gold and silver recovered from that ton of ore, and then dividing the remaining cost sum by the number of pounds of copper obtained from the average-value ton of ore mined. Comparisons made between this last figure and the existing selling price, or the anticipated future selling price, can then be used and definite conclusions formed.

## Mines vs. Mining Propositions.

An announcement of interest to people who are being asked by promoters to invest in mines is quoted as follows:

The business men of Helena, Mont., have set an example that might well be followed by the residents of all mining towns who have the welfare of their locality at heart. In future every mining company that claims Helena as its home will be thoroughly investigated by the Committee on Mining of the Helena Business Men's Association; and, if it is found to have any "wildcat" characteristics, it will be unsparingly condemned through the medium of the press, and unsuspicious investors will be warned away.

The necessity of this move has been made apparent from the fact that, throughout the East, a large number of these irresponsible mushroom companies have been formed, without a foundation in fact for their extravagant claims of fortunes that await those who buy their stock. The fact that a decided interest is being taken in the mineral district round about Helena has caused numbers of these unscrupulous concerns to claim a location in this city.

Postmaster A. P. Fisk states that he continually receives letters from all parts of the East from people asking the Postmaster if they can place confidence in such and such a company. He has repeatedly gone to the county records, only to find that such companies never existed, except in the imaginations of their putative officers. Fisk has so informed all who have applied to him for information.

The idea voiced in this announcement is to be commended, but in simple justice to all the interests that will be affected by its proposed action, there should clearly be recognized the difference between "mines" and "mining propositions." A mine, a real mine, cannot be a wildcat. A mining proposition may be a "wildcat"—a fraud—without reservation on any point. The promoters cannot help knowing if their proposition is this kind of a "wildcat." A mining proposition may be a "wildcat," and yet, the mine that is its asset may be a real mine. Fraud, misrepresentation and extortion should be unsparingly condemned, not by indecisive generalization, rumor or repute, but by a statement of the true facts of the particular case investigated. It is to the interest of a community to have its undeveloped mineral deposits prospected. This involves risk surely, and loss possibly. To these legitimate burdens communities should see to that there are not added fraud and theft. Expressed in other words, a community should in self-protection see to it that it is not made by promoters, under pretense of mining in its vicinity, the opportunity for robbing the pockets of strangers attracted by the pretence.



## Concentrates.

THE lead production of the world for the year ending June 30, 1901, is estimated at 617,300 tons.

THE tensile strength of Manila hemp fiber averages about 30,000 pounds per square inch of section.

A MAGNETIC method of separation is employed in Joplin, Mo., to take out the pyrite from zinc concentrates.

THERE are now in operation in California electric power transmission plants, using water as the prime mover, that aggregate over 80,000 H. P.

SINCE the Seattle, Wash., assay office was opened on July 15, 1898, it has received gold of the commercial value of \$52,780,579.45, principally from the Klondike and Alaska.

AT the Onelda mine, at Sutter Creek, Amador Co., Cal., fuel oil at \$1.50 a barrel is equal to wood costing \$4.50 a cord, with the balance of lesser advantages in favor of the oil.

THE largest single shipment of refined copper on the Great Lakes is 2800 tons, worth almost \$1,000,000, taken by the steamer Mohawk, from Dollar Bay, Houghton, Mich., in October, 1901.

In sinking the shaft on the Senator mine, at Steamboat Springs, Nevada, drill holes are kept several feet in advance of the sinking, in order to indicate the presence of hot water channels from the hot Steamboat springs adjacent.

A TWENTY-FIVE-TON charge of powder in one blast at the Decleville quarries, near Los Angeles, Cal., is estimated to have loosened 200,000 tons of rock, which would be a breaking from place of four tons or two cubic yards to the pound of powder.

THE depreciation and repair bill on water power plants is less than on steam plants. Four per cent is usually ample to cover these two items in water power plants, while the corresponding allowance for a steam or gas engine plant is from 10% to 15%.

THE United States Supreme Court has sustained the State law of Tennessee making store orders redeemable in cash. One of the opinions upheld the law as applied to State corporations and the other decision sustained it as applying to foreign corporations.

THE annual report of Mine Inspector Hall of Michigan shows 13,498 men employed in copper mining in Houghton county during the year ended Sept. 30, a decrease of 473 from the aggregate of the preceding year. Accidents numbered thirty-three, eleven being fatal.

THERE is no work on the "Distillation and Analyses of California Crude Oil." As the treatment of Pennsylvania and Russian oils are dissimilar to that required in the California oils, books describing the refining of these oils are only suggestive as to the mode of refining California oils.

EXTRAVAGANCE is a fault of which no true engineer is guilty. One of the greatest claims the engineering profession has upon the respect of the public is that it works constantly and persistently to increase efficiency, to reduce cost, to convert what is harmful or useless into sources of wealth and to avoid waste.

THE chief medical officer to the Government of the Gold Coast in Africa, Dr. N. Kaye, says that twelve months residence on the coast of that country and eighteen months up country are, in his opinion, the outside limits that white men should be compelled to stay, after which they should take six months leave.

THE Keswick Electric Power Co. has put in near Shingletown, in Shasta county, Cal., a pipe line 6800 feet long and 3 feet in diameter, delivering water at the water wheel under 1200 feet head. The pipe is set in a cement bed. Two days were taken to fill it, in order to give the pipe an opportunity to take up the strain of the water column gradually.

THE U. S. Circuit Court in what is known as the King case of the Bunker Hill M. & Concentrating Co. vs. the Empire State-Idaho M. & Dev. Co. held that two claims could not be located on the linear section of one vein so as to give both locations extralateral rights. In other words, one owner could not split the vein by two planes and follow down indefinitely under the locations.

THE weight of the U. S. silver dollar is 412.5 grains, of the Mexican 418.16 grains. The U. S. dollar is 1.5 inches in diameter and .08 inch thick. The Mexican dollar is some larger, but very little. The U. S. dollar is 900 fine in silver, 100 in copper. The Mexican dollar is 903 fine in silver and 97 copper. The Mexican dollar often contains a trace of gold from the imperfect refining methods used.

TWO ARIZONA COPPER MINING COMPANIES, the Shannon and the Arizona, operating contiguous mines at Clifton, have by conveyances carried out an agreement which forever eliminates the question of extralateral rights as between them. They have made the common boundaries on both end and side lines vertical planes, regardless of the apex, strike or dip of an ore body crossing the line.

IN the California quartz mining regions it is usual to find the larger number of the springs coming to the surface on the uphill side of the quartz veins. The country rock stratification collecting water, it descends with its bedding until the quartz veins are encountered, cutting off the continuity of water channels in the country rock

and diverting it upward under pressure along the relatively free contact with the ledge.

ALASKA has three hour meridians, the 135th, the 150th and the 165th degrees of longitude from Greenwich. The 135th is two minutes twenty-four seconds of time west of Juneau and the meridian is just one hour west of the 120th meridian, which determines Pacific standard time in the U. S. Southeastern Alaska is to use 135th meridian time, which will be known as Eastern Alaska time, and thus continue the system of standard time in use in the United States.

A GOLD BELT or copper belt is a form of expression used to describe a line or band of ore deposits of the particular metal which in the relation of the deposits to each other suggests the idea of a common geological origin and, incidentally, continuity. It is not intended to convey the idea that the continuity must be direct or close. The several deposits which are together designated a "belt," may be separated by intervals of several miles in which no deposits are found.

THE efficiency of the undershot water wheel is from 27% to 30%, of breast water wheels from 45% to 50%, of overshot water wheels from 50% to 70%, of various types of turbine water wheels from 70% to 88%, and of various types of tangential water wheels from 85% to 92% for large wheels and 75% to 85% for small wheels. It is considered safe to take the efficiency of good modern water wheels at from 80% to 85%. Generally the efficiency does not fall off very much at three-fourths load.

OWNERS of farms at Redding, Cal., 6 miles southeast of Keswick, where the copper reduction plant of the Mountain Mines Co. is situated, have again brought suit against the company for damages and a restraining order to compel the company to condense the sulphur fumes from the open-air roasting of the copper and iron pyrites preparatory to smelting. The company alleges that it is impossible to condense the fumes except at such a cost as would make their business unprofitable.

THE cost of water per horse power year is quite variable, and an average figure is of little significance, as it can easily be misleading used as a basis of estimates. About the lowest figure is the cost of a Canadian plant (\$6.25). Niagara water power is sold for \$13 per horse power year, from which its cost may be inferred as being nearly as low as the Canadian referred to. At some installations the costs run up to \$25 and \$30 per horse power year. The average figure is stated to be from \$10 to \$12.

THE Visalia, Cal., Dist. U. S. Land Office has made a decision in an oil land case in favor of the homestead claimant, in which the facts are claimed to be that the mineral location for oil was made and title to it passed by deed from the locators before the homesteader made his filing and entry on the land. Later the owners of the location undertook to start sinking a well and were ejected by force by the homesteader, who had before this commenced his residence on the land. The decision will be appealed from.

NO ONE can say which county of California, or indeed of any State or Territory of the West, is the best for a prospector. They are all good. They all offer the opportunity for the prospector. It is impossible to say of any of them, "all is now known of possible mines it is possible to know." The history of all of them proves that there are always others—mines which the late comer does discover for the first time or mines which the first comers discarded.

SOUTHEASTERN ALASKA is limited to that portion of the district including and extending from the Lynn canal southeasterly down the coast to the Portland canal. It includes only a portion of the narrow strip of coast, taking in the islands and a strip of mainland 30 miles wide. The islands are very superficially explored. Douglas island at Juneau and some of the islands near Ketchikan have been explored inland from the coast, but only to a very limited extent. The strip of mainland has been explored back of Juneau and Wrangal, but very little at other points. West of Icy straits the district is described as the Seward peninsula, never as southeastern Alaska.

ZINC AMALGAM is sometimes used for copper plates. When so used the copper plate should be cleaned with a swab with well diluted sulphuric acid; then while still wet the zinc-mercury mixture is applied. To prepare the zinc amalgam clip sheet zinc into small pieces and immerse them in mercury, after washing them with a little weak sulphuric acid and water to remove any oxide. When the mercury will absorb no more zinc, squeeze through chamois leather or calico, as for silver amalgam, and well rub in. The plate thus prepared should stand for a few days, dry, before using. If, before amalgamation with gold takes place, oxide of copper or other scum should rise on this plate, a little very dilute sulphuric acid will instantly remove it.

A NEW METHOD of economically recovering the tin from the tin plate scrap and clippings has been patented. A convenient vessel is divided by a porous or permeable partition, preferably, for cheapness, made of wickerwork. One side is filled with coal, the other with tin plate scrap, the former being the cathode, the latter the anode, and the charging electrolyte being sea water or a salt solution. A number of such cells are made and connected up, forming a battery capable of working a separate electrolytic bath, for plating or other useful purpose. The iron dissolves to ferric chloride, the tin partly falls to the bottom and part passes to the coal

(the cathode). The final solution of any iron is effected in the electrolytic bath. The process is such that the separation of the tin and solution of the iron yields the current necessary for cleansing the recovered tin.

AN excellent permanent corner monument for a mining claim can be made with concrete. A pit 16 inches square can be excavated 16 or 18 inches deep if in soil or gravel, or to bedrock only if the latter is a less distance down. In this set a form made of inch boards 12 inches square clear inside dimensions. The height can be such as to project from 12 to 30 inches above the surface as desired. Mix the concrete in the proportions of one part cement, two parts sand and five or six parts clean gravel or clean broken rock. Fill this into the form, ramming it as the filling proceeds. Large pieces of rock can be used in the center of the mass to save concrete. For marking, letters made of wood, "V" shaped, can be faced against the side of the form in their proper relative places as the filling proceeds. When the top of the form is reached the concrete can be leveled off or shaped as desired. The boards of the form should not be nailed together. At least one side should be fastened with screws or clamps to admit of easy removal when the concrete sets. After the box is removed the wood letters are picked out and the monument is finished with a float of clear cement. A monument of this description is preferable to wood posts in localities where claims are many and valuable and where in or adjacent to considerable centers of population. Wood posts decay readily and are easily destroyed. While very satisfactory for locations, the value of which is undetermined, wood posts should be replaced with stone or concrete monuments where the mines are valuable and permanent.

WHAT is known as the "hole contract" system of payment for work to miners is a method originated by Carl E. Davis, E. M., superintendent of the Center Star and War Eagle mines, at Rossland, B. C., to meet the local conditions and requirements in those mines. Under the day-labor wage system the amount of work performed per man working underground was found unsatisfactory. The breaking of ore in the mine was not confined to definite wall limits but varied irregularly with the extent of mineralization of the hard country rock, which when rich enough was ore. The width to be broken varied from 4 or 5 feet to 100. The amount of ore to be broken varied so that no contract system of payment based on ore broken down could be used satisfactorily. These changes, however, did not affect the rate of drilling per man over 5% monthly. Payment was then made to miners on the number of feet drilled monthly, machines being used. The place, direction and approximate depth of the holes to be drilled are designated by the shift foreman. The length of holes drilled is measured at the end of the shift time before blasting and a copy of the record given to the contracting miners. The men work in crews of four, two on each eight-hour shift. The third eight-hour shift is given to blasting. Under this system the amount of work done by the men was satisfactory to the management and the miners earned an average of \$1 a day more than they did working for day wages. The comparative costs to the mine were per ton of ore broken in stoping, by the (hole) contract system, \$0.477; by the wage system, \$0.865. In development work, per foot of drift heading, (hole) contract system, \$8.79; wage system, \$11.14. Drift heading advance per month average was increased under the (hole) contract system from 50.8 feet to 97.5 feet. In shaft sinking the rate of advance per month increased from 27.2 feet to 58 feet.

TUNNELS, as an alternative construction for the wooden flume conduits used for supplying water to the electric power plants in the California mountains, are being seriously considered. The difficulty with the flumes is danger from breakages due to forest fires. The enormous cost is the objection to tunnel construction. The danger to flumes from fire can be reduced very much by clearing the land adjacent to the flume of trees and undergrowth before constructing the flume. A clearing of 40 feet on each side of the flume is sufficient. On the upper side a shallow cut should, where practicable, be made to receive burning pine cones as they roll down the mountain slopes. The special point of danger to the flumes is in the footing of the high trestle bents. Here the clearing should be specially thorough to keep a grass fire from reaching the sills and post footing. The construction of trestle bents to support a flume should be avoided by the substitution of an excavated grade in the rock the full width of the flume. Part of this grade can be made a dry wall, if more convenient. Every spring the cleared strip should have the grass burned off of it and the starting undergrowth cut down by the flume tenders. The preceding, accompanied by vigilance on the part of the tenders and a flume full of water, should make the starting of a fire impossible. Tunneling should be a last alternative. It is subject to dangers of its own, in liability to caves, which stop the flow of water, and are more difficult to repair than a burned flume. There is notice of a fire and a chance to protect against it. A cave will come without warning, and the conditions surrounding the operation of a power plant limit the opportunities for inspection. A substitute for flume construction that is cheaper than tunneling and free from its objections otherwise is the grading out of the mountain side the full width of a ditch and a base for its outer wall. On this base a concrete wall can be built and the floor of the ditch can be grouted with cement. This construction is more costly than a wooden flume, but much less costly than a tunnel would be.



## Quartz Mining in Korea.\*

Written for the MINING AND SCIENTIFIC PRESS.

The Korean Government has granted several concessions to foreigners for mining purposes, but only two of these are carrying on work on the ground. Of the two the Oriental Consolidated Mining Co., an American corporation, in the northwestern part of Korea, has passed the prospecting stage and become a bullion producer. A description of this company's mines and their operation may be taken as a fair illustration of what can be expected from mining in this country.

These mines are situated in the northern part of Ping-Yang Province, about 300 miles north of Seoul, the capital of Korea. The route of transportation is by steamer from Nagasaki, in Japan, to Chinnampo, in Korea, five days' journey, with stops, thence to Anjou, one day on a small steamer owned by the company, and from Anjou 38 miles on a good road by wheel or horse. The journey from the mines to Chemulpo takes ordinarily three days by water, or ten days overland. The overland route is the winter route, steamers being shut out by ice.

Sixty-five miles west of the mines is the city of Wee-ju, the walled city that, since the first settling of Korea, has guarded the gate to China. The main road from Seoul to Peking passes through Wee-ju. The city is on the Yalu river and looks directly into China—the "great country" of the Koreans. The nearest point of the Yalu to the mines is about 25 miles, and every summer large numbers of Chinese cross into Korea and travel to the mines in search of work.

The gold quartz mines being worked by the Oriental Consolidated Mining Co. are scattered. The three main camps may be considered as forming the points of a triangle whose sides measure about 23 miles. These camps are connected by telephone. At the present writing there are three mills in operation, one of forty stamps and two of twenty stamps each, while another of forty stamps is being con-

are very skillful with a double-hand hammer, and their white foremen claim they are equal to the best white miner at that work. They cannot, however, be relied upon to place their holes, nor to handle powder. Seemingly they cannot realize the care necessary when working with explosives. Add to this the fact that they are inveterate thieves and shirkers, and it will be seen that only by constant watching and searching can they be made to do a day's work and prevented from stealing anything they can lay their hands on.

Each shift has a native boss, who assists the American on duty. He can usually speak a few words of English.

Preparations are being made to install a compressor to try machine drilling.

The mine hoist engineers are all Koreans, usually boys between eighteen and twenty-two years. They show more aptitude than older men and quickly become expert, though they seldom know anything

that the amalgamator has as many natives as he pleases to help him. It is on battery work that the Chinaman looms up. Some of them are as valuable as white men around stamps and mortars. On the other hand, the concentrators are tended, almost without exception, by Korean boys.

Japanese engineers, under the supervision of a European machinist and engineer, attend the big mill engines and do the repairing of engines and pumps. Each camp has one or more Japanese blacksmiths, who do very good work. Several white carpenters and millwrights are on the concession, and a number of Japanese carpenters are employed. Around the mines Korean carpenters frame timbers and do other rough work, but their work is poor and crude compared to that of the Japanese, who excel in light work. The wages paid to Asiatics is very low. The following is about the usual rate per month in United States gold:

|                                                              |                    |
|--------------------------------------------------------------|--------------------|
| Korean mine bosses.....                                      | \$10.00 to \$30.00 |
| Japanese engineers, blacksmiths and carpenters.....          | 25.00              |
| Korean carpenters, timbermen, engineers and blacksmiths..... | 9.00               |
| Korean or Chinese miners.....                                | 7.50               |
| Korean or Chinese shovelers, car men, mill hands, etc.....   | 6.00               |
| Coolies.....                                                 | 4.50               |

While these rates seem at first glance ridiculously low, it must be remembered that, comparatively, the Korean workman is very little worse off than the American at home. His monthly board and room cost him \$2 per month at a native hotel, or, for coolies, 44% of his wages. When he lives at home he spends only \$1.50 for his food, or 33%, leaving him 66% over and above his food and room. Comparing this with the same grade of labor in America, which commands from \$1 to \$1.60 per day, with board from \$12 to \$24 per month, it will be seen that the difference is very slight. And when the Korean turns to clothe himself and buy his tobacco he is at a great advantage over his white compadres, for one suit of clothing lasts him until it rots away, and costs but 50 cents to \$1, while he can buy a backload of tobacco for the same price.

Lumber and oak cordwood are delivered at the mines by Koreans for \$15 per thousand and \$2.25 per cord, respectively. Mining supplies and other freight is delivered at Chinnampo by steamer, thence to Anjou by the company's vessels, and from Anjou to the mines by wagons and native bull carts. The stores carry a stock of necessities and many luxuries, though the difficulties incident to the transportation often cause a famine in certain articles, and prices are necessarily high.

Mail reaches the mines about every ten days by a regular system of carriers between camps and the nearest postoffice, and the concession is in direct communication with Chemulpo and foreign cable by the Imperial Korean Telegraph, which has an office and operator at the main camp.

The climate at the mines is not disagreeable. Spring opens about March 1, and from then on the weather is like early summer in California, until July 15, when the rains begin. Then until September 15 is a two months' rain, broken by a few good days. It is hot and steamy all the time. September to December 1 is ideal weather, and on December 1 the winter sets in cold and sharp, with little snow and the extreme of cold 30° below. The average low temperature mark is probably 8° below for a normal winter.

### Clearing Powder Smoke From Mine Workings by Engine Exhaust.

TO THE EDITOR:—Having occasion to call into use some mechanical method of clearing prospect workings of powder smoke, the exhaust of a gasoline engine used for hoisting suggested itself as a possibility in that way. Some 2-inch steel casing was procured, a 2-inch tee was placed in vertical exhaust pipe just above the engine, a short piece of 2-inch pipe was bent to about 24° from horizontal, and the casing was attached to this with plain coupling, one end gas and the other casing thread. The casing was carried upward at this angle some 30 feet to the air pipe from underground workings. At the head of the gallows-frame the air pipe has a diameter of 6 inches, which at this point was enlarged to 8 inches for a length of 2 feet to compensate for reduced space by the presence of the exhaust pipe. Here the exhaust pipe was by a bend back to horizontal carried through the side of enlargement and elbowed upward centrally to the air pipe. A short nipple was screwed into the casing, the casing was suspended by hangers at suitable intervals between the air pipe and the engine, while at the upper end of enlargement of air pipe one joint of 6-inch air pipe was added, making the arrangement complete. There had been some little apprehension that this length of exhaust pipe, with bends and couplings, might by added friction impair the efficiency of the engine, but this was not the case, at least to no harmful extent.

From the top of the gallows-frame to the bottom of the shaft is 150 feet, and from the bottom of the shaft to the end of the drift 120 feet. With full load the engine showed no weakness and the induced current of air through the pipe was full and strong. While the sharp shot of the engine set up a pulsating



Gate at Anjou, on China-Korea Boundary.



Oriental G. M. Co. Mill and Buildings at Tabowie, Korea.

structed. A cyanide plant is treating the concentrates from one mill, and a second cyanide plant is being constructed at one of the other mills. The concentrates from the third mill are shipped to American smelters. At only one of the camps is the ledge capable of being worked by tunnels, shaft mining being necessary on the others.

The labor is all done by Chinese, Koreans and Japanese. Underground, some claim that the Chinese make the best single-hand drillers, while others prefer Koreans. There are some Korean miners who

miner in Korea is not only to plan his work, but to keep a constant lookout to see that it is executed as he plans it.

Drill and pick sharpening is also done by Koreans, and to shape a drill properly is apparently one of the things it is impossible to teach a native. The rock is not very hard on drills, as a rule, but a bull-nosed bit is invariably the result of the Korean's work. They seem to lose sight of the cutting qualities of a bit in their anxiety to get one they can be sure will not break.

The methods of milling do not differ materially from those practiced in the United States, except

\* See illustrations on front page.



vacuum in the upper portion of the pipe, this by the elasticity of the long column of air in the pipe was reduced at the lower inner end to a steady inflow. The whole arrangement cost about \$9 and my own work in fitting.

W. D. LINTON.

Wadsworth, Nev., Oct. 26.

## Late Gold Dredging Practice.\*

Written for the MINING AND SCIENTIFIC PRESS  
by RALPH L. MONTAGU.

Gold dredging had been carried on successfully on a moderate scale in New Zealand for some years before the installation of the first successful dredger in the United States. Various machines had been set up in different parts of the country, but from one cause or another they were not a financial success. In some cases there was not sufficient gold in the gravel to make the work profitable; in others, the gold was so fine that it could not be saved; but in the majority of cases the machinery was either too lightly constructed or the final disposition of the tailings had not been sufficiently provided for.

Among other of the earlier attempts, in the autumn of 1894 a company was organized to dredge the bed of Grasshopper creek, near Bannack, Mont. The ground had not enough grade to sluice, and, owing to the nature of the gravel, drifting was considered very dangerous. The company acquired a group of claims lying along the creek and a mining ditch that extended to within about 3 miles of the property. By extending the ditch a head of 348 feet was obtained, and a Pelton water wheel and dynamo were used to obtain power for the dredger.

Bannack was the scene of a mining excitement in the early '60s, the bars on either side of the creek were mined and \$20,000,000 was taken out by the simple methods then in use; the bed of the creek and the bottom land adjoining were not touched, with the exception of a few isolated places where drifting was tried, but not very much was accomplished, owing to reasons already given.

The dredger, which was built by the Bucyrus Co. of South Milwaukee, Wis., was of the elevator type, and consisted of a chain of alternate buckets and links capable of excavating to a depth of 25 feet. The buckets had a capacity of 5 cubic feet, and the gravel elevated by them was dumped into a short rotating grizzly having openings 5 inches in diameter. A stone chute carried the boulders overboard, the screened material dropping into a hopper, from which it was elevated and dumped into the sluice box by a second chain of buckets.

The water for sluicing was obtained by means of a 12-inch centrifugal pump. The sluice boxes were supported on cables extending across the creek. The dredger was built during the spring of 1895 and began operations during the latter part of June. It is believed that a description of the numerous difficulties that were successfully encountered and overcome will be useful to those who contemplate dredging, as they indicate points to be avoided.

The first trouble arose from the power house. The Pelton water wheel, which was placed inside a cast iron casing, was not given sufficient clearance; consequently, when the full stream of water was turned on, and when the throttle valve was wide open, the dead water, instead of falling from the wheel, was carried around inside the casing, and, acting as a break, lowered the speed of the dynamo. This reduced the voltage, and, acting on the motor that drove the centrifugal pump, reduced the speed below a point at which it was possible to lift water. The trouble was remedied by removing the casing from the pump and by lengthening the shaft that carried the water wheel. This placed the bearings further apart and allowed sufficient clearance.

The secondary chain of buckets that elevated the screened gravel from the hopper to the sluice box next gave trouble. It was found that the buckets on the under side of the ladder rubbed against the enclosing case. The hopper was not large enough, and the chain was driven from the bottom tumbler. This difficulty having been overcome, it was found that the arrangement for supporting the sluice boxes was not of sufficient stability. This was counteracted by supporting the sluice box from the under side of a restle. Differential chain blocks were used to regulate the grade. This arrangement was finally changed to an auxiliary flatboat that carried the sluices.

Some of the motors on the dredger were overloaded and their armatures burnt out; this caused further delay. But the greatest disappointment was the fact that bedrock was not reached at 25 feet. This would not have happened if the ground had been prospected before the dredger was built. Bedrock (35 feet) was finally reached at the end of the first season (1895) by excavating a pit as deep as possible, lowering the water level and then excavating farther. This necessitated handling the gravel twice in some cases.

The results obtained from the gravel taken from near bedrock were found to warrant a further expenditure, and during the following winter the dredger was changed, so that it was possible to dig to a depth of 35 feet below water level, and various minor changes were made in other parts of the machinery.

In the spring of 1896 this dredger commenced ac-

tual work, and, with the exception of temporary delays caused by the breakages, it has been in successful operation ever since. Further on, in considering the various types of dredgers, the final development of this machine will be shown.

**ECONOMIC ADVANTAGES OF DREDGING METHODS.**—Throughout the mining districts of America there are various deposits of gold-bearing gravel that cannot be successfully worked except by dredging. In some cases a scarcity of water and insufficient grade prohibit ground sluicing or hydraulicking. In California the anti-debris laws prevent hydraulicking unless a restraining dam is built to hold the tailings. This adds considerably to the cost of mining.

A dredger will work successfully on a perfectly flat piece of ground and needs only enough water to counteract evaporation and seepage. It may be said that a dredger creates an artificial grade by elevating the gravel to a point from which it can be sluiced back into the cut from which it was excavated.

A dredger can work the bed of a large river, which if attempted any other way would need wing dams, pumping and other expenses to add to the cost of mining.

Where there is sufficient volume of water with head enough to hydraulic successfully, the same water power if applied to water wheels and dynamos will generate enough power to drive a dredger or dredgers that would handle 2½ times as much gravel as could be done by hydraulicking.

Hydraulic placer mining appeals to the investor on account of its simplicity of operation and its apparent economy; but in the majority of cases, when a pit is worked out the entire plant has to be moved into a new position to handle further gravel.

This amounts to a periodic expense of considerable magnitude, whereas a dredger when once in operation does not call for more expenditure than enough to renew and repair parts that wear out. A dredger will handle ground quite as economically as can be done by hydraulicking; but no dredger has been able up to the present to clean bedrock thoroughly where the bedrock is hard and cut up by deep crevices. Where the bedrock is soft, of clay-like consistency, and rotted and broken to shallow depths, it can be cleaned thoroughly with the right type of machine.

As a rule, dredgers are "cleaned up" every week, in some cases oftener. This, compared with the clean-up of a hydraulic mine at 30-day or season intervals, is a decided advantage.

Dredgers are working now in deposits of gravel that are 45 feet deep. At depths over 60 feet the extra cost of a machine and the difficulties to be overcome in the construction of it are such as to practically prohibit dredging at this depth, except where the deposit is very rich and will pay the added costs.

Dredging is technically a satisfactory method, because self-contained. The entire plant is at all times under the eye of the operator.

Before putting a dredger on a piece of ground, it should be, of course, thoroughly prospected.

A Keystone drill seems to be the preferred apparatus for this work.

The ground is surveyed into square plats of equal area and a hole is put down at the corner of every square. An average should be taken from every hole, the mean depth to bedrock ascertained, and from these results one can determine approximately the value per cubic yard and the total amount of gold in the deposit.

The physical character of the gold should be determined and carefully considered, since the commercial success of the investment rests on the ability to save the gold.

I would advise, in addition to the drilling prospecting, the sinking of several shafts to bedrock in order to better determine the nature of the gravel, and to get an idea of the size of the boulders. One type of dredger that is successful in light gravel may be inefficient and useless in a coarse gravel with large boulders.

The lowest cost at which ground has been handled by a dredger is 6 cents per cubic yard; this included operating expenses, repairs, management, depreciation of plant and official expenses. This degree of economy was only reached after several years of practical work and experimenting to get the best efficiency obtainable from men and machinery.

I do not wish the investor to expect that every dredging proposition can be handled on those terms. If, at the end of a year's run, it is found that the repairs and operating expenses are as low as 6 cents per cubic yard of gravel handled, the result can be considered very good.

The first cost of a dredger has a certain ratio to its capacity. Other conditions being equal, a dredger that would handle 4000 cubic yards per day would cost considerably less than the cost of two dredgers to handle 2000 cubic yards each in the same time. The cost of handling the gravel in the first case would also be less per cubic yard than in the latter case.

A large tract of low-grade ground might be profitably handed by a company who put in a number of large machines capable of handling on an average 5000 cubic yards per day per dredger; whereas if the same ground was cut into smaller lots, each owned by a different company operating dredgers at from 1200 to 2000 cubic yards per day, the various invest-

ments might barely pay expenses. This is the commercial condition that requires advance consideration.

On the whole, however, there is no other class of mining investment where there is a smaller element of chance. With the ground prospected thoroughly and the proper class of machines installed, success is assured. The product gold is the standard of value and is not affected by the commercial disturbances that affect other values.

The ideal dredging proposition can be defined as a deposit of gravel, not over 35 feet deep, overlying a soft bedrock, with about 20 miners' inches of flowing water on it. There should be little or no timber or brush on the land. There should be not more than 5% of the gravel composed of boulders, the largest not to exceed 400 pounds. The gravel should average 25 cents or more per cubic yard throughout in gold, which is coarse and evenly distributed from top to bottom through the gravel. Cheap electric power or cheap fuel would complete the favorable conditions. If there was more water in the stream than 20 inches it would be immaterial.

The other factors mentioned all bear directly on the cost of mining. Timber has to be cut down and stumps in some cases must be blasted out. Brush and roots have to be pulled out of the buckets as they come up, or else they will choke the screening apparatus. Coarse gold is easier saved than fine, and the gravel containing it need not be screened so fine; this makes a small saving in the power required.

Where there are a large number of boulders in the gravel, the buckets have to be made heavier; they cost more and take more power to operate.

Very few places will be found to entirely conform with the ideally desirable conditions; but a considerable divergence from these conditions is possible before the proposition would become unavailable.

(TO BE CONTINUED.)

## Gold and Silver Production for the Year 1900.

Director Roberts of the Mint has prepared a statement showing the production of the precious metals for the calendar year of 1900. It shows that the production of gold in the world that year was 12,457,287 ounces, of the value of \$257,514,700—a loss in value of \$49,070,200 from 1899. The loss was mainly in the Transvaal field and due to the war. The production of South Africa in 1899 was of the value of \$73,277,100 and in 1900 \$9,671,000. The principal gains were \$8,118,000 in the United States and \$6,600,000 in Canada. The United States again heads the list. In the United States the principal gains were by Alaska, Arizona, Colorado and Utah.

The silver output of the world amounted to 178,796,796 fine ounces, the largest ever known. It exceeds the product of 1899 by 11,572,513 ounces. The United States again leads all other producers, with a slight excess over Mexico.

The production of gold in States and Territories producing the largest amounts is estimated by the director as follows:

|                   |             |
|-------------------|-------------|
| Alaska.....       | \$8,171,000 |
| Arizona.....      | 4,193,000   |
| California.....   | 15,816,200  |
| Colorado.....     | 28,829,400  |
| Idaho.....        | 1,724,700   |
| Montana.....      | 4,698,000   |
| Nevada.....       | 2,006,200   |
| Oregon.....       | 1,694,700   |
| South Dakota..... | 6,177,600   |
| Utah.....         | 3,972,200   |

The commercial value of silver in the States and Territories producing the largest amounts is as follows:

|               |             |
|---------------|-------------|
| Arizona.....  | \$1,872,210 |
| Colorado..... | 12,700,018  |
| Idaho.....    | 3,898,062   |
| Montana.....  | 8,801,148   |
| Utah.....     | 5,574,912   |

## The chief countries producing gold are:

|                              |              |
|------------------------------|--------------|
| United States.....           | \$79,101,000 |
| Mexico.....                  | 8,900,000    |
| Canada and Newfoundland..... | 27,904,100   |
| Africa.....                  | 9,671,700    |
| Australasia.....             | 74,260,000   |
| Russia.....                  | 20,145,500   |
| Austro-Hungary.....          | 2,141,700    |
| Colombia.....                | 1,809,500    |
| Brazil.....                  | 3,330,300    |
| Venezuela.....               | 1,089,500    |
| British Guiana.....          | 2,035,900    |
| French Guiana.....           | 2,241,300    |
| Peru.....                    | 1,085,200    |
| China.....                   | 5,574,400    |
| Korea.....                   | 4,500,000    |
| British India.....           | 9,433,500    |

The commercial value of silver in countries producing the largest amounts is as follows:

|                              |              |
|------------------------------|--------------|
| United States.....           | \$35,741,100 |
| Mexico.....                  | 35,611,400   |
| Canada and Newfoundland..... | 2,578,200    |
| Australasia.....             | 9,703,400    |
| Austro-Hungary.....          | 1,233,000    |
| Germany.....                 | 3,361,300    |
| Spain.....                   | 1,974,900    |
| Bolivia.....                 | 6,723,600    |
| Chile.....                   | 2,947,900    |
| Colombia.....                | 2,183,400    |
| Peru.....                    | 5,295,200    |
| Japan.....                   | 1,029,400    |



### A New Electric Chain Coal Mining Machine.

A coal cutting machine now manufactured by the Sullivan Machinery Co. of Chicago, Ill., is claimed to be an entirely new departure along this line and promises results which a short time ago would have been considered impossible.

It combines in one machine both the breast and longwall types and is of simpler construction than the ordinary machine. The sumping cut in the room is made, as shown in Fig. 1, similar to the breast machine, and from its position at that point, without being moved or reset, it cuts across the room, as shown in Fig. 2, traveling on its own base and propelling itself, no skids or track being necessary.

The superiority claimed is in this arrangement, for if the time used in the operation of the ordinary breast machine is divided into three parts—one-third for the feeding process, one-third for backing out and one-third for moving and resetting—it is doing actual work only one-third of the time; while in the case of the Sullivan machine there is no resetting from the time of its first advance until it is withdrawn after it has undercut the entire face.

One of the greatest advantages claimed for this machine is that there is practically no heavy labor connected with it. It is loaded, unloaded and moved about the room by its own power.

Owing to the construction of this machine, it holds itself under the coal, while traveling across the face, without the use of jacks, saving the labor of the third man employed on longwall machines to shift the heavy jacks which hold the cutter under the coal as the machine advances.

In making its face cut, the Sullivan machine advances by means of a feed chain, the extremities of which are fastened on opposite sides of the room, the machine starting at one corner and pulling itself toward the other extremity of the chain. The depth of undercut is controlled by the runner by simply tightening or loosening the feed chain by means of the special jack.

For work in hard or soft coal it is necessary to have the machine equipped with several sets of feed gears, the hard formations requiring a slow feed. These feeds run from 14" a minute in hard coal to 42" a minute in soft. For instance, if the machine is provided with a 6-foot cutter bar, in one minute's operation with the feed at 42" a minute it will cut 21 square feet of coal.

What is claimed by the manufacturers as the world's record for coal cutting was recently made with this machine in the Dickason mine at Linton,

### A Swinging Ore Bin Gate.

Written for the MINING AND SCIENTIFIC PRESS by D. E. BIGELOW.

The ore bin gate illustrated herewith has been found very convenient, particularly for filling cars under ground, in narrow tunnels, where there is little room for the operating gear of other forms of gates.

Owing to the position of its point of support, the weight of ore upon it assists in closing it and holding it closed; and as it displaces no ore as it swings about its bearing, it is very easily opened.

Sheet iron of No. 8 or 10 gauge is heavy enough for any ordinary size, as its circular form and the way it is supported nicely resist the strains coming upon it.

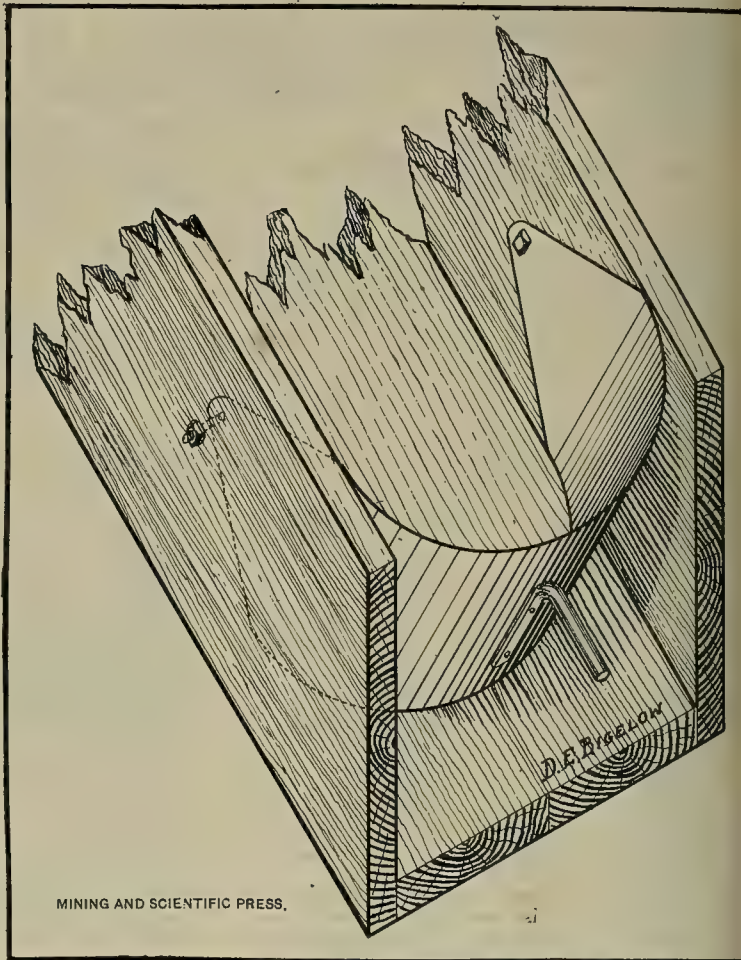
Simple of construction, it may be made in an hour at any mine and as easily put in position, or transferred from an abandoned chute to a new one.

### Relation Between Engineer and the Laws of Nature.

The relation between the engineer on the one hand and the laws of nature on the other is unique, and differs from the relation that exists between any other professional man and nature. Unlike the geologist, who is limited in his observations to those favorable localities which nature has been kind enough to unfold for his inspection, or the biologist, who must stand merely as an observer of nature's acts, the engineer pins nature down and forces her to answer his question. It may be only a yes or no, but it is an answer;

organic nature. He alone of all professional men has an unvarying criterion by which he may decide the right and the wrong, the correct and the false. He gets accurate data by which he may build his bridge, construct his dynamo or lay out his railroad. Departure from these data means failure. Other professional men are subject to varying human laws and human notions, and so get along without ever having before them an absolute standard; but the engineer is forced to be in harmony with natural laws, his work must be absolutely truthful, his logic must be without flaw. Sophistry and ignorance are not for him. He must know, and know accurately; he must reason, and reason logically. If he does not know the stresses in his bridge, the endurance of his material or the details of his dynamo, he cannot rank as an engineer. Nature, calm and dispassionate, is always on guard over him. No other man in the world, I believe, unless it is the chemist or physicist, is subject to such rigid and unceasing discipline; no man's errors are so glaringly brought to light as his. The lawyer can fall back on the plea that the judge was biased or the jury packed; the doctor may, perchance, bury his mistakes; but the mistakes of the engineer bury him. We accept his success as natural, because it is in harmony with nature's laws; his errors are glaring, because they are out of harmony with nature. All the world sees his failures. A mere tyro can recognize a poor roadbed, defective machinery or a dangerous bridge. The engineer has then for his ethics the most dignified and exalted standard; he has an absolute and unvarying criterion for truth and error; he has over him a judge who will decide with unerring swiftness that his work is a failure if he violates the law.—V. C. Alderson in Armour Inst. of Technology Year Book.

THE requirements for admission to the Colleges of Mechanics, Mining and Civil Engineering of the University of California at Berkeley have again been raised and will go into effect in 1905. The change will require that all applicants for admission must have concluded a course in geometrical drawing, representing one daily exercise a week for one school year. The requirement calls for continuous training in the use of drawing instruments, in the solution by graphic methods of such geometric problems as shall emphasize the necessity for accuracy and neatness. In connection with this there must be a continuous treatment in the Reinhardt system of free hand, lettering and round writing. The course should be a general one, affording preparation for technical drawing, as taught in the Colleges of Engineering, as well as for the purposes of business life. Also for the Colleges of Engineering there will be required two subjects from this list: Latin, Greek, English, French, German, of which one must be French or German. The colleges affected are the most popular at Berkeley and have become too crowded for efficient work.



A Swinging Ore Bin Gate.



FIG. 1.



FIG. 2.

Ind., where a run of 360' 6½-foot undercut was finished in eight hours. During this run the machine was moved to six different faces and operated from start to finish by only two men.

and since he can vary his questions—that is, the conditions of his experiment—he can ultimately get the information he desires. He deals with the immutable, the unchanging laws of in-

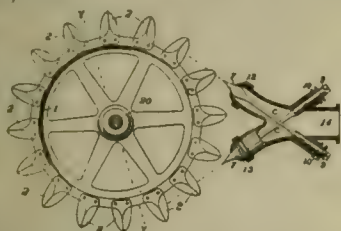


## Mining and Metallurgical Patents.

Patents Issued October 22, 1901.

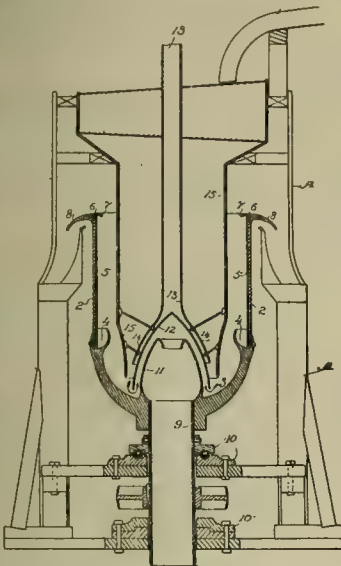
Specially Prepared for the MINING AND SCIENTIFIC PRESS.

WATER WHEEL.—No. 684,800; W. A. Doble, San Francisco, Cal.



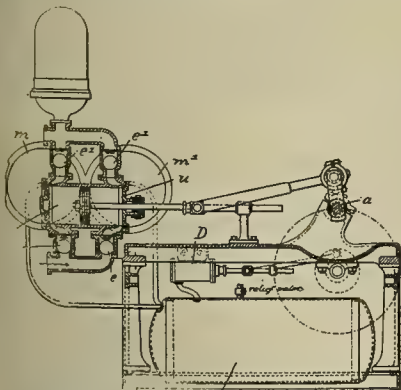
A reversible tangential water wheel having a series of oppositely faced buckets, faces similar and of double ellipsoidal form, a transverse wedgelike bottom common to both, wedgelike partitions on each face in central plane of wheel, in combination with a branched nozzle, each branch curved from normal to discharge tangentially to pitch line of centers of buckets, oppositely to other, and a movable spindle-shaped core piece in each branch, with stems and balancing pistons, each branch having a converging lip surrounding core piece, whereby discharge jets are made to impinge on buckets in unbroken section.

GOLD SEPARATOR.—No. 685,005; A. R. Palmer, Oakland, Cal., assigned to the firm of Palmer Gold Separating Co., Oakland, Cal.



This invention consists of a revoluble vertically disposed cylinder adapted to contain mercury or amalgamated or silvered plates having an inwardly projecting flange around the top to prevent the overflow or escape of the mercury while allowing the lighter material to constantly flow over and be discharged. The bottom of the cylinder is so constructed that the material delivered therein will be carried outwardly and upwardly by centrifugal force and by overflow caused by constant additions from the feed apparatus which delivers the material centrally into the bottom of the cylinder. Water is added to the mass in suitable quantities and by means of a proper overflow any portion remaining in the apparatus after it is brought to a state of rest may be washed out through this discharge.

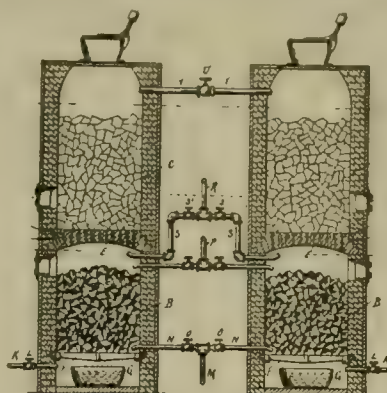
PRESSURE REGULATOR FOR PUMPS.—No. 684,806; K. Enzinger, Worms, Germany.



A pump cylinder and valved suction and delivery pipes, a chamber in open communication therewith having interior capacity equal to interior effective capacity of pump cylinder, a diaphragm in chamber, means for applying pressure on side of diaphragm, opposite communication with cylinder, whereby diaphragm may yield when liquid discharge rises above predetermined pressure, and means whereby pressure in rear of diaphragm is kept from increasing

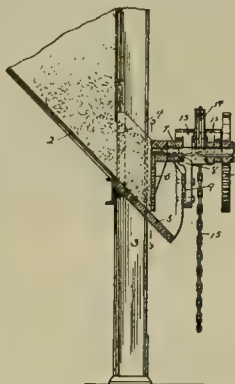
as diaphragm recedes, whereby upon increase of pressure of liquid discharge pump is at once rendered inoperative.

PROCESS OF PRODUCING LIME OR CEMENT AND COMBUSTIBLE GASES.—No. 685,064; A. L. Schutert, Sacramento, Cal.



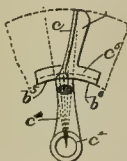
Passing heated products of combustion of burning fuel through a mixture of raw cement and carbonaceous fuel, thereby expelling all gaseous matter and vapors of water, clinkering partially burned cement by burning residual combustible matter, and subsequently passing all products of combustion of burning fuel, together with all gaseous matter and vapors of water, from mixture of raw cement and carbonaceous fuel, through a body of highly heated fuel.

ORE GATE.—No. 685,153; A. M. Levin, Wilkesburg, Pa.



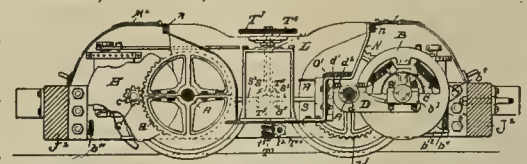
A chute having bottom curved in cross section, an upright gate journaled above center of chute and rotatable transversely thereof, journal being adjacent to upper edge of gate, which is straight, with edge of lower portion of gate curved complementary with chute.

CENTRIFUGAL PUMP.—No. 685,167; G. McKay, Newport, R. I.



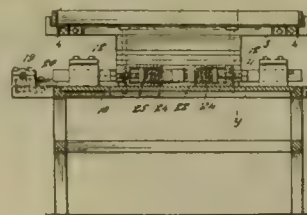
An annular fluid passage provided with central inlet at opposite sides and outlet, shaft extending transversely of fluid passage, blades extending radially from shaft to revolve throughout extent of fluid passage by rotation of shaft, blades being curved and narrowed in width toward their free ends, and fluid passage being contracted from inside outward to present at periphery an area equal to outlet pipe, curvature and shape of blades and narrowing of fluid passage giving a constant and equal pressure to fluid at all parts of passage over blades.

ELECTRIC MINE LOCOMOTIVE.—No. 684,950; C. Robinson, Columbus, Ohio.



The axles A, A', arranged relatively close together, motors arranged between ends of car frame and axles, gearing connecting armatures of motors with axles, a casing inclosing parts and forming a centrally arranged depressed chamber or compartment between axles, chamber being of such form as to provide a seat above each axle, a rotary trolley support or base on one side of central chamber, a corresponding support or base on opposite side of chamber and devices for controlling both motors and brake mechanism arranged within compartment, within reach of operator seated on either seat therein.

AMALGAMATOR.—No. 685,184; H. M. Smith, Libby, Mont.



A skeleton frame, a pan supported in frame, a table, a bolster secured to frame and mounted to slide on lower portion of table, a bolster for upper end of frame consisting of removable sections, bolts for securing sections together and to frame, and means for imparting lateral sliding movement to frame.

Some Recent Additions to the Collections of the California State Mining Bureau.

Fine specimens of azurite and cerrusite from New Mexico.

Native mercury on crystallized calcite, Marfa and Mariposa mines, Terlingua, Texas; Montroyd Sharpe.

Quicksilver ore, St. John mine, Solano county, Cal.; Alf. Tregidgo.

Asbestos, Hazel creek, Shasta county, Cal.; Benj. F. Miller.

Rich silver ores, with gold, La Palma mine, Durango, Mexico; Dr. G. E. Davis.

Spinel (gem variety), Ceylon, India, and fine tourmaline crystals, Mesa Grande, San Diego county, Cal.; A. E. Heighway.

Very handsome blue marble from a new locality, near Riverside, Riverside county, Cal.; Kretek & Vertiska.

Gold quartz, showing free gold, Blood mine, near Murphys, Calaveras county, Cal.; P. E. Condit.

Native mercury with cinnabar, vanadinite and pyromorphite, and cinnabar with included fragments of charcoal, Marfa and Mariposa mines, Terlingua, Texas; Montroyd Sharpe.

Halite (rock salt), of exceptional purity, Virgin river, Lincoln county, Nev.; J. Bell.

Rich auriferous pyrite and free gold, Thunder mountain, Idaho; G. W. McAllister.

Quicksilver ore, Elgin mine; Sulphur Creek, Colusa county, Cal.

Concretionary hydromagnesite, Bolinas, Marin county, Cal.; Robert U. Collins.

Very rich silver ores, (called by the Mexicans "petanko"), mines of the La Dura M. & M. Co., Sonora, Mexico.

Auriferous gravel, showing free gold and gold washed from it, Kunz hydraulic mine, Klamath river, Siskiyou county, Cal.; J. S. Lowden, Jr.

Gold quartz, Bull of the Woods mine, near Summer-ville, Trinity county, Cal.; J. Liebrandt.

Copper ores from seventeen new mines and prospects in California. H. S. DURDEN, Curator.

## The Mother Lode of Atlin, B. C.

The country rocks from the northeast shore of Atlin lake to a little north of Boulder creek and east and west from McKee to Monro mountain are magesian eruptives, principally a hard, green diorite. This hard diorite seems to be cut diagonally by a belt of soft, decomposed magnesite, interlaced by bands of serpentine; the width of this belt has not yet been determined, but its course seems as follows: Beginning at Boulder, it runs south, cutting Birch, crops again at Pine, keeping the valley, down to Stevendyke, where it seems to leave Pine, crossing Spruce, and here heading for McKee creek. In crossing the divide from Spruce to McKee, coming from the direction of Boulder, the same rock formation may be found and followed across McKee, losing itself in the slate formation east of the creek.

This mineral-bearing magnesite is cut diagonally by quartz veins, which seem to have a northeasterly strike, and dips 60.20 east. The country rock for many feet on each side of the vein seems to be impregnated with mineral with values in free gold sufficiently high to pay handsomely for milling. So far as the prospecting work has been done on Pine creek rich bodies of rock have been shown, and in cross-cutting the ledge matter the extent of the pay has not yet been determined, although the cuts have been run some 30 feet. The strike and dip of the new find on Pine is the same as that of the Yellow Jacket and the vein has the same characteristics. Above the Yellow Jacket the same rock has been found carrying values, and here seems to strike undoubtedly in the direction of Gold Run. Although no vein has been discovered as yet in this vicinity, we believe some will be during the winter while drifting for placer, as quite a proportion of the placer gold taken from Gold Run is sharp, having in many cases the same quartz attached.

One cannot help but observe that wherever a creek has cut through the above-mentioned body of magnesite rich values have been found in the adjoining placer claims, showing plainly that the wear and tear of the water has simply done the milling of the rock, depositing the gold below.—The Atlin Claim.



## MINING SUMMARY.

Specially compiled and reported for the  
MINING AND SCIENTIFIC PRESS.

### ALASKA.

#### JUNEAU.

The Mammoth and Jackson quartz claims at Snettishan, owned by C. Morse and S. Kohn, have been bonded to G. Bach of Juneau. A lower tunnel is in 150 feet and an upper tunnel is in 125 feet. The vein is from 6 inches to 4 feet wide.

At the Rodman Bay mines the magnitude of the ore body is said to approximate that of the Treadwell mines at Douglas. Rodman Bay is about 60 miles from Sitka, in Baranoff island, and the mines are 8 miles from tidewater. The Rodman Bay Co., principally English capital, is the owner. The ore is low grade, but in great quantity. It is claimed that the mountain is a mass of low-grade ore, running from \$3 to \$4 per ton. Geo. Bent is manager.

#### ARIZONA.

##### COCONINO COUNTY.

Twelve asbestos claims in Grand Canyon have been sold by J. Hance, C. H. McClure and the heirs of W. H. Ashurst, of Williams, to S. W. Selfridge of New York for \$10,000.

##### GILA COUNTY.

T. G. Cockrill, of Platte City, Mo.; G. S. Watkins, W. N. Bowen and F. A. H. Garlicks, of St. Joe, Mo., officers of the Pinto Creek M. & S. Co., have been at the company's mine on Pinto creek to determine plans for the further development of the property. The Yo Tambien is now opened by a shaft, crosscut tunnel and drift to a depth of over 250 feet, and the buying of machinery necessary to develop to a greater depth is under consideration.

##### GRAHAM COUNTY.

Adjoining the Fleming Bros.' claims in the Galuria mountains there has been discovered an additional vein 30 feet wide which samples over \$25 gold to the ton. A half-ton sample, taken from all the ledges, shows much of the rock when crushed held together by wire gold.

##### MOHAVE COUNTY.

J. P. Jacobson of Minneapolis, Minn., president of the Arizona Northern M. Co., is in Kingman preparing to start up the Senator mill in Lost Basin. He has bonded several mines and purchased the Senator 20-stamp gold mill.

W. Grant and F. O'Dea have bonded the Gold Basin mill and the O. K. gold mine near Kingman.

##### PIMA COUNTY.

J. Quinn, in charge of the Grand Reef mine, near Solomonville, is said to have resumed work on that mine, making a general cleanup of the machinery and pumping out the water. This mine is owned by J. W. Mackay of New York.

##### YAVAPAI COUNTY.

M. J. Lester, who bought from G. W. Swartz, for \$10,000 cash, some placer ground on the Big Bug, has installed a steam shovel, that will handle 600 cubic yards of gravel per day, and other machinery, expending, it is stated, \$40,000 before starting up. The plant in operation is said to be a success; from a four days' run made recently \$4000 was the clean-up. Only seven men are employed and it is estimated that the expenses will not exceed \$50 per day. The plant installed is substituted for the Swartz plant of two men and two horses with which about \$100 per week net profit was obtained.

##### YUMA COUNTY.

O. A. Knox has bought for J. S. Jones of Colorado Springs, Colo., the Planet copper property on Bill Williams Fork of the Colorado river. This includes fourteen claims and five mill sites, and has belonged to O. Angsade for many years.

### CALIFORNIA.

#### AMADOR COUNTY.

The shaft on the Argonaut mine is down over 1900 feet. Ten stamps of the mill are kept running half time on ore from the south drift at the 1200-foot level. This drift, it is reported, has been run 2000 feet from the shaft into Hoffman ranch, lately bought by W. F. Detert for mining.

At the Kirkwood mine sinking has been resumed, to go 200 feet deeper, taking the shaft to a depth of 750 feet. At the 550 level a low-grade ore body was encountered.

#### BUTTE COUNTY.

Eastern people have secured control of the Catskill and Bishop mines, near Bangor. Pumping has been commenced on the latter.

#### CALAVERAS COUNTY.

At the Jones mine at Railroad Flat twenty-eight men are employed, sinking

the shaft and stoping out ore. The mine is owned by a Boston, Mass., company.

The Afterthought mine, near Railroad Flat, is being developed by its owners, with W. W. Cook Supt. A 2½-foot vein of ore that runs \$25 to \$60 to the ton is exposed. A vein of good milling ore 4½ feet in width is in the face of the tunnel. A mill test of 200 tons is being taken from the various shoots exposed.

At the Poorman mine, near Railroad Flat, a tunnel will be run 2500 feet from the south fork of the Mokelumne river to cut the vein 900 feet from the surface. The main working shaft is now down 360 feet and will be sunk to 600. A mill will be erected.

A San Jose company is opening up the Conrad gravel mine at Railroad Flat under B. Jennings, Supt.

The Oriental M. Co. has bought the Calaveras mine on Indian creek, near Murphys, and is now making preparations to build a 20-stamp mill. The cyanide plant is about ready for operations. The company is receiving bids for sinking the three-compartment shaft.

#### EL DORADO COUNTY.

Mr. Coles and Mr. Eastwood have already begun the rebuilding of the hoisting works at the Zantgraf mine, and hope to have it in operation within twelve or fourteen days. Work of construction on the new mill will be begun soon.

#### KERN COUNTY.

Supt. McMahon states that the Butte mine at Randsburg at its last milling of eighty-seven tons cleaned up \$5244, the average being about \$60 per ton. This ore came from the 375-foot level. The total production since June 1, 1900, has been \$73,500, average value per ton \$79.10.

The Yellow Aster Co. at Randsburg have ordered a new boiler at the Goler wells. Both mills are now running and are crushing 450 tons of ore daily. The total cost of the new 100-stamp mill, complete, is stated to have been about \$105,000.

#### MONO COUNTY.

S. G. Lines of San Francisco, president of the Alamo M. Co., operating in Antelope valley near Bridgeport, says that arrangements will be made for putting a mill on the property in the spring, if the mine continues to improve as it has up to this time.

#### NEVADA COUNTY.

(Special Correspondence).—The Girard M. Co. of Sacramento, operating in Meadow Lake district, have had a 4-stamp mill in operation all summer. Have been crushing about eight tons per day. This has turned out from \$40 to \$50 gold per day above all expenses, besides 20% (1.6 tons) concentrates per day, containing \$45 to \$55 gold. The company has lately added four more stamps and it is the intent to place hoisting machinery of greater capacity on the property and sink a new shaft. The Crystal Lake G. M. Co., Francis W. Breine of Philadelphia, manager, have built a boarding house 24x40 and an office building, and a 10-stamp mill is being erected by G. A. Nihell of Nevada City, which it is expected to start up by Nov. 15th. In connection with these operations, an Eastern company is erecting a rotary roasting furnace, using crude petroleum for fuel, the oil to be hauled 33 miles from Truckee. This furnace will be used to oxidize the heavy sulphureted ore before milling. The company has leased the Excelsior group (the Hartley mines) consisting of four claims. This group has a large body of ore which will average about \$7 per ton free and 15% to 20% concentrates going \$45 to \$70 per ton gold. These concentrates yield easily to chlorination or cyanide.

Cisco, Oct. 27. C. W. R.

The Red Cross mine at Omega, under bond to J. A. Brent, who has been developing it for several months past, has been leased by him to a company of working miners, who propose to continue operations.

C. Graham of Nevada City has interested San Francisco and Sacramento people in Shady creek on the San Juan ridge. The company has over 2 miles and will bond the entire creek as far as Cherokee, 4 miles in all. At the Phelan ground, flumes will be built to work this winter. It is proposed to work both the tailings and virgin ground by a system of undercurrents. Two lines of flumes will be built, one over the other. In the upper flume cast-iron bars will be placed, on which the gravel and tailings are deposited. The bars separate the coarse material, allowing the fine to run into the lower flume, the coarse debris being carried away. In the lower flumes quicksilver traps are provided, which will catch the fine gold which escaped with the debris from the hydraulic mines. Mr. Graham is superintendent.

The New Independent mine, at Moore's Flat, has been pumped out to a distance of 230 feet. All the machinery on the prop-

erty has been placed in good condition and development work has been commenced.

G. C. Sargeant of the Sargeant mine at Quaker Hill is superintending the construction of an impounding dam. The barrier will have a capacity of holding back a great volume of debris. As soon as it is completed a United States debris commissioner will inspect it and, if accepted, active work will be commenced for the winter.

The Ironclad mine, near Rough and Ready, was opened up many years ago and sunk to a depth of 180 feet, but excessive water encountered caused abandonment then. This mine and the Mistletoe mine are owned by a San Francisco company, headed by a Mr. Canfield. Under Supt. Hay these mines are now being reopened.

#### ORANGE COUNTY.

The Santa Fe Railroad Co. has just brought into flowing at Fullerton an oil well that yields 570 barrels of oil of 22° gravity in twelve hours. The flow is continuing without any signs of diminution. The well is 2000 feet deep—the deepest in the county. The hole is 16 inches in diameter at the top and 7 inches at the bottom. The company, it is said, values its new gusher at \$200,000.

#### PLUMAS COUNTY.

Gobert & Leshner have bought the Bushman quartz mill and will remove it to the Crown Point mine, near Quincy, which they have been developing. Whether it will run by water power or steam has not been decided.

#### SAN DIEGO COUNTY.

It is reported that the California King G. M. Co. has commenced actual construction on its projected plant at Picacho, near the Colorado river. The plant will have a capacity of 1000 tons of ore a day and will be largely automatic in detail. The plant includes a 5-mile railway from the mines to the mill. The mine will be provided with steam shovels, capacity one ton, and the cost of loading, it is anticipated, will not exceed 2 cents a ton after the ore has been broken down at an estimated cost of not more than 6 cents a ton, including blasting. The company, it is said, expects to mine and mill the ore at a cost not to exceed 75 cents a ton.

#### SHASTA COUNTY.

The semi-annual report of the Mountain Copper Co. shows a large increase made in the output of its mines and also that much lower grade ore is now being treated than formerly. The 172,782 tons of ore smelted in the six months ending June 30th last yielded an average of 94 pounds of copper to the ton, or 4½%. In the year previous 207,571 tons were treated, which yielded an average of 129 pounds of copper, or 6½%. In the whole of the year 1900 the Mountain Copper Co.'s output amounted to 26,850,880 pounds of copper. Its net earnings were \$1,458,000, or a little less than 6 cents for each pound of copper produced. On the basis of the first six months, its output for 1901 will be 32,565,120 pounds—about 30% more than now being produced by the Quincy mine at Lake Superior. It is claimed that the Mountain Copper Co. operated to a disadvantage last year by reason of the fact that its smelter was reconstructed and enlarged. Though its plant had a capacity of 750 tons daily, it smelted an average of only 575 tons. Its plant has been increased to 1000 tons daily capacity, and, according to its report, has treated an average of about 950 tons daily since the beginning of the present year.

G. Vanderbilt and J. H. Bryan of Dunsuir are building an arrastra on a gold quartz claim on Long gulch, near Dunsuir.

The Bully Hill Copper M. & S. Co. employs about 500 men in the mines and smelter. The smelter includes a Bessemer converter. The ladles, of a capacity of three tons each, are handled by a traveling electric crane. A main hoist, capable of handling twenty tons, lifts and carries the ladles and an auxiliary five-ton hoist tips the ladles for pouring. The engineer rides with the traveling crane. The entire plant is operated by electric power and lighted by electricity. The slag is broken up by an egg-shaped iron weight of perhaps 4000 pounds fastened to the auxiliary hoist. A hydraulic elevator runs up and down into the converter room. Very little smoke is noticeable. The furnace is a large-sized water-jacketed blast furnace. Three tons of matte is delivered from the furnace at each "tap." In the plant is a briquetting machine, of a capacity of 100 tons a day. Briquettes are composed of the fine ore particles, are round in shape and weigh four pounds. In the main furnace room, or charge floor, the briquettes are stacked to dry to the amount of 500 tons. In the smelter yard there are two 25,000-gallon water tanks, and sixty stall roasters and two mechanical roasters for finely divided ore. The stall roasters resemble coke ovens. All of the roasters are connected

by a flue with the main brick stack which carries off the fumes from roasters and plant alike. The machine shop is fully equipped and modern in every detail. The powerhouse is equipped with blowing engines and dynamo.

The Three Sisters gold quartz mine at French Gulch has been bonded by Ellery Bros. to V. Fox and D. Perano at \$10,000 for eighteen months. The bonders have started development work in the Grayson shaft.

A Keystone driller run by a traction engine is being operated on Clear creek, near Redding, by Postlethwaite & Loughborough of San Francisco. If the prospecting proves successful a dredger will be installed.

#### SIERRA COUNTY.

The Dudley mine at Forest City, owned by H. A. Greene of Los Angeles, is prospecting well again. Considerable dead work has been done and the bedrock has been broken through into the channel, which has widened out. H. Murray is Supt.

The Brush Creek and Ante-Up mines, situated near the Mountain House, have been bought by W. Corbin of San Francisco.

Sacramento people have obtained control of the Mohawk quartz mine, near Alghaney, and will open up the property at once. A hoisting plant will be installed and sinking commenced. Rock recently taken from the Mohawk paid \$16 to the ton.

#### SISKIYOU COUNTY.

The O. & C. quartz mill, near Henley, is being built rapidly by contractor G. W. Cooper of Yreka. The company, with C. W. Tyrer as manager, will start crushing ore.

A Cripple Creek company of Colorado miners is preparing to open up Ash creek below Henley and will put in an extensive flume.

H. Thompson and J. A. Hennessy say they will put up a 10-stamp quartz mill on the Meyer's mine, on Yreka Flats, which they have recently bought.

#### TRINITY COUNTY.

W. Montgomery states that at the mine owned by the Bob's Farm M. Co., at Rattlesnake, the largest ledge will average over 30 feet in width and the ore runs in free gold from \$3 a ton up. The mine is equipped with a 2-stamp triple discharge mill and an electric plant will be put in next spring.

At the Lucky Hall mine, at Hall City, the company has opened up a good shoot of ore. The mine was discovered by W. R. Hall, now of Carters, Tuolumne county, who is still interested in it.

The Lappin mine, near Lewiston, is reported sold to Pittsburg, Pa., people for \$110,000.

#### TUOLUMNE COUNTY.

Supt. Stayton of the Badger mine, near Rawhide, is developing a strong 4-foot vein of high-grade ore. A mill is proposed to be erected soon.

The Mohican mine, F. Chappellet Supt., on the main Tuolumne river, near Jacksonville, has seven tunnels on a vein, which is 6 feet wide in places. The lower tunnel, 30 feet above the river, is in 150 feet. The 5-stamp mill is nearly completed.

The Goldwin mine mill has started crushing ore. Supt. J. L. Partz says that sinking the shaft 100 feet deeper from the 500 has been commenced.

The Green Jumper M. Co. will soon resume work at their mines near Confidence.

At the Von Tromp mine, near Sonora, the stamp mill has been completed. Ore on the dump is estimated sufficient to keep the mill running for five months.

The John Royal M. & M. Co. have reconveyed to C. W. Troyer, A. E. Troyer, O. L. Anderson, J. T. Watkins and E. Watkins the John Royal quartz mine, near Columbia, the consideration not having been paid.

### COLORADO.

#### CLEAR CREEK COUNTY.

(Special Correspondence).—The Georgetown-Silver Plume district has been from the first a high-grade camp. During recent years the tonnage has not been great, but the values seem to keep up almost to their former grade. C. K. Wolf, manager of the Chamberlin sampler at Georgetown for the last twelve years, states that the ore handled by him at that point for 1900 had an average value of \$109 per ton. He also figures that the output of that camp for 1899 amounted to \$557 per capita of the adult population of the camp. In the district generally the leasing system prevails and operations go on with little friction.

The Mendota, Scepter, Smuggler, Stevens, Paymaster, Mineral Chief and Commonwealth are the principal mines in which the lead product exceeds the silver and gold, hence these are called the lead mines, though their ores run 15 to 50 ounces silver. The Dunderburg, Seven-



thirty, Bismarck, Pelican and Allunde produce ores which run very high in silver, and whose lead values also run well up.

McClellan mountain section, close to the Continental Divide, is known as the gold belt, the properties there being the Stevens, Huckleberry, Independence, Johnson, Mendham, Bullion, Commonwealth, Paymaster and Santiago. Their ores carry silver, gold and lead. The Waldorf Co. has 700 acres on the east slope of McClellan mountain, where they are running the Argentine tunnel westward, which is in 400 feet. On the opposite side the Stevens tunnel is being driven eastward to connect possibly with the Argentine.

The Red Oak Co., made up of Iowa people, are operating the Astor, Scepter and Sunburst, on Democrat mountain. A 1600-foot drift in ore that averages over 2 feet wide has been run on the Scepter. This ore is a lead sulphide which it is believed will make a 50% lead concentrate. It is also said that it will run fair values in gold and silver. The Astor is an old property, whose ore will be cut 800 feet below the old workings. A 2½-mile tramway runs from the mine to the new mill in the valley. The latter is undergoing some changes under the directions of J. G. Roberts of Idaho Springs. It is expected to be operating as a concentrator in a few weeks.

The Welch mine, after eighteen years idleness, is being reopened by L. R. Fry. It has ore that runs high in silver and well in lead. He has shipped a number of carloads.

The Sporting Times, on Griffith mountain, is being reopened by Iowa people, in charge of F. Schrott.

The Central Colorado, on Leavenworth mountain, carrying silver, gold and copper, is being developed.

J. Warren Brown of St. Louis, Mo., one of the stockholders of the Dunderburg, has large holdings on the right of the stream between Georgetown and Silver Plume, on Republican mountain. They have been idle ten years by reason of litigation, but were profitably worked prior to that time. The suits involved two groups—the Lebanon and the Republican mountain—which cover 2 miles of surface along the strike of the ore belt. The litigation has been terminated and Mr. Brown is on the ground presumably to reopen the properties. WASCOTT, Georgetown, Oct. 16.

#### DOLORES COUNTY.

There is a movement among Dolores county miners to consolidate readily workable contiguous groups of mines instead of operating by independent effort. This has been done in many districts to their advantage. At Rico the Pro Patria M. & M. Co., W. J. Scoutt manager, appears to be taking the lead in such work. It has twelve claims on Dolores mountain adjoining the Enterprise and Stanley mines. There is a main tunnel in 2700 feet, crossing fifteen veins. Its 100-ton concentrating mill, with electric power and electric separators, is under construction.

#### GILPIN COUNTY.

The Defiance G. M. Co. of New Orleans, La., is working the Defiance mine in Russell district, near Central City, under a bond, with W. S. Robinson as manager.

#### GUNNISON COUNTY.

The Citizen mine and Citizen group of claims in the Pitkin district, composed of twenty-two claims, have been sold by Mrs. J. L. Osgood of Denver to the Wallace M. Co. of Denver for \$32,500.

#### LAKE COUNTY.

In the rock-drilling contest at Leadville the prizes were divided as follows: First money, \$750, Malley and Chamberlain, Leadville, 40½ inches; second, \$350, Ross and McNichols, Rossland, B. C., 39½; third and fourth money, \$200 and \$150, respectively, divided between the tie teams, McKenzie and Make of Leadville and Davey and Freethy of Butte, Mont.

#### OURAY COUNTY.

H. Scott and R. Richards, while on the Tiffin lode at Cow creek, have opened up a large cave filled with lead carbonates, carrying silver chloride.

#### PARK COUNTY.

(Special Correspondence).—Schlessenger & Co. are operating the Last Chance mine, 17 miles west of Fairplay, on which they have a bond. This mine, which is a producer of siliceous silver-lead ore, is at an altitude of about 13,000 feet and is well developed. Recently a new vein has been opened. Some smelter shipments are being made; but most of the output is mill ore, and Mr. Schlessenger says a concentrating plant is to be built 2 miles from the mine at a point 3000 feet lower. Fairplay, Oct. 23.

#### SUMMIT COUNTY.

(Special Correspondence).—The Juniata group of twenty claims, located on Nigger hill, was acquired some time ago by Colorado Springs parties. It was considerable

of a producer in former years, and is now being reopened and re-equipped under the management of Mark Evans. Present work consists of a 780-foot tunnel that crosscuts several veins and a shaft at a higher point. The tunnel will be driven 200 feet farther to cut the Juniata vein, on which the shaft sinks. This vein is said to be opened for 2000 feet on its strike from the shaft. It is 245 feet vertically from collar of shaft to level of the tunnel.

The Mecca placers, on French gulch, have operated a portion of the season. It is stated that 288 yards of bedrock gravel yielded \$9 per cubic yard. This was taken from the old river bed, where there is 22 feet depth of gravel to bedrock. A new pipe line, 24-inch diameter, has been put in this season and Evans hydraulic elevators are being installed, with the idea of handling the material cheaper and more rapidly.

Most of the ore being shipped from Breckenridge is that of lessees operating on old properties on Farncome hill.

Breckenridge, Oct. 18.

(Special Correspondence).—The Summit M. Co., operating the Summit mine and Wilfey mill, in charge of E. E. Byron, are producing an iron, lead and zinc ore, having silver, lead and gold values. The same company have also fixed up the Excelsior mill at Frisco, which belongs to Ault & Wiborg, and will send part of their mine tonnage to it.

The Eagle mine, belonging to Peter Breene, is shipping sixty tons a day of sulphide ores. The mine is opened through a shaft down 200 feet vertical and 700 feet on pitch of the vein. A half-mile tram line delivers the ore from the mine to the shipping bins at the railroad near Kokomo.

Kokomo, Oct. 19.

Smith & Bradbury have put a force of men at work on the Mollie R. mine, near Breckenridge.

#### TELLER COUNTY.

C. M. Clinton of Denver has taken a two years' lease at a 20% straight royalty on the middle block of the Golden Wedge claim of the Mary Jane Co. at Cripple Creek. He intends to sink a shaft from the surface and install a steam hoisting plant.

#### IDAHO.

Parties arriving at St. Anthony from Henry's lake report the discovery of gold found in what is termed rotten granite in the hills about 3 miles south of Dwellah. Samples of the stuff brought here are said to run from \$1.50 to \$100 gold per ton. About 2 miles of ledges have been staked, and between thirty and forty men are camped in the locality, building cabins and preparing to work during the winter.

#### ADA COUNTY.

The Elmore group, near Boise, has been sold to A. L. Morris of Boise and H. A. Smith of Salt Lake City.

#### IDAHO COUNTY.

W. A. Stevens, manager of the Buffalo Hump Co., has bought one-third interest in the Cracker Jack mine in the Hump district. The consideration is the completion of 250 feet of drifting upon the south vein and the installation of a complete 10-stamp milling equipment upon the property.

W. L. Farnsworth of Lewiston says Newsome creek district is showing well. The Tim Conley ledge is widening with depth and the high values continue. An arrastra has been started and it is reported that a daily cleanup of \$500 is being made. The N. P. M. Co., of which Mr. Farnsworth is one of the directors, is now ready to install a mill. About 250 feet of work has been done and on the lowest level the ledge showed 3 feet of \$100 ore.

#### SHOSHONE COUNTY.

A 20-ton carload of gold ore has been shipped from the mines of the Etruscan G. M. & M. Co., near Murray, to test the ore for the best method of treatment. The company has determined to build a 20-stamp mill on the ground. J. Johnston is manager.

The Snow Storm M. Co. has reached the ledge, 500 feet in the crosscut tunnel. The footwall rock shows copper minerals and was mistaken for ore. On the level 530 feet above the tunnel the ledge showed 12 feet width of ore where it was cut. In the tunnel is 37 feet all ore except 2 feet on the hanging wall. The ore is said to run over 7% copper, 12 to 18 ounces in silver and \$2 to \$3 in gold. No process has been determined as to the method of treatment, but the selection of a leaching process is considered likely. The mine was originally located years ago and a shaft sunk 80 feet in ore all the way down, but the property was abandoned, then relocated, the new owners shipping from the old dump a carload of ore that considerably more than paid charges.

#### WASHINGTON COUNTY.

(Special Correspondence).—The Heath

M. Co. has decided to erect a concentrating plant on its mine in the Heath district, development of the mine having been in progress for several months. The company has water power which will be utilized in generating electric power to operate the mill, compressor and for lighting. Buildings have been erected and operations will continue through the coming winter. McKinney & Hall of Welser are local managers, the principal stockholders being in New York, Philadelphia and Erie, Pa. L. S. Welser, Oct. 27.

The Copper Queen M. Co., Ltd., has been incorporated in Idaho, with office at Pocatello and \$500,000 capital. The incorporators are E. E. Calvin, F. Dunn, J. L. Craig, A. C. Heald, W. G. Lane, E. Purcell, G. H. Olmstead and F. S. Deltrich. The company owns three copper claims—the Herald, Athens and Ridgeway—in the Heath mining district, 16 miles from Cambridge, on which development work has been done.

#### MONTANA.

##### FERGUS COUNTY.

The new mill plant of the Barnes-King mines at North Moccasin is crushing 110 tons of ore daily. Recent development work in the mines has exposed an immense amount of ore, which is now being broken from an open cut and passed through chutes into the cars below. At present only four miners are employed in breaking the 110 tons of ore.

Work on the plant of the Kendall Co. at North Moccasin is progressing. The excavations are completed and a part of the framework has already been raised. H. H. Lang is in charge of the construction and states that the mill will be ready about the first of the coming year.

#### NEVADA.

##### ESMERALDA COUNTY.

The Consolidated Esmeralda Co. has been incorporated under Arizona laws to operate the Pamlico mine, owned by W. D. Tobey, D. L. Bliss, J. A. Yerrington and J. Forbes of Carson City.

##### HUMBOLDT COUNTY.

The American Niter & Potash Co. has made a shipment of three carloads of niter to San Francisco from its works near Lovelock. Two carloads of niter and two of salt will also be shipped.

##### LINCOLN COUNTY.

Control of the April Fool M. Co.'s mines and mill at De Lamar has been bought by a Salt Lake City, Utah, and Montana syndicate, headed by S. Bamberger and J. D. Wood, on a basis of about \$100,000 for the whole. The company's management has been reorganized with W. S. Godbe of Salt Lake City as president, S. Bamberger treasurer and D. L. Wertheimer secretary. With these officers, R. Lieber and J. B. Leggat of Butte, Mont., will be directors. E. Godbe has taken charge of the mine as manager.

J. Chisholm of Salt Lake City, Utah, is preparing to develop sulphur deposits of great extent. According to a report from T. W. Forrester, they are close to the grade of the proposed railway through Lincoln county. The beds are said to be capable of producing a large tonnage of almost pure sulphur, which can be mined at very little cost.

##### LYON COUNTY.

P. Gallagher, sinking on his gold discovery near the Mason Pass, is down 23 feet and the ledge has widened out to 3½ feet. On top the ore assayed from \$60 to \$100 per ton, and in the bottom of the shaft assays have been obtained that go over \$200 per ton.

##### WASHOE COUNTY.

W. H. Ivey of Washoe City has sold the Morgan mine and mill in Galena canyon to Salt Lake City, Utah, people, for \$15,000.

#### OREGON.

##### JACKSON COUNTY.

Reed & Fletcher, at Meadows district, near Jacksonville, have sunk a shaft 112 feet and cut a vein 11 feet in width which runs well in canabarr. —The Rogue River Quicksilver M. Co. has men at work sacking ore, which is growing richer with depth. —Hammersly & Chisholm are steadily working on their claims, as are also Chapman & Co.

F. Kauster, who has been working his quartz claims on Foothills creek, near Ashland, is having a crushing made at the custom mill at the latter place. The ore shows coarse gold.

J. H. Bagley has bought the Noah Bowers group of eight placer claims on Ward's creek from J. Wimer & Co. W. A. Corthell of Ashland, H. Perkins of Central Point and T. Olsen of Gold Hill are interested with Bagley. The new owners will operate on a more extensive scale.

##### JOSEPHINE COUNTY.

W. F. McNeil's mine on the Chetco

river, 16 miles from Kerby, is equipped with a hydraulic plant. The gold obtained is nearly all coarse, heavy, smooth channel gold, though some rough gold is obtained.

A rich body of ore is reported uncovered at the Baby quartz mine, in Jump-off-Joe district. A 26-inch vein has been cut 80 feet in from the surface. The mine is operated by Meyers, Rice & Smith of Grants Pass.

#### SOUTH DAKOTA.

##### LAWRENCE COUNTY.

(Special Correspondence).—The Spearfish G. M. & R. Co.'s new 200-ton cyanide mill at Ragged Top was destroyed by fire this morning. The fire started in the lower part of the building. The origin of the fire is unknown, but is supposed to have caught from small boiler in the refinery corner of the mill; the building, being of wood, and dry, burned like tinder. The mill has been in operation less than a year; the operation has been quite successful and has shown that the immense ore bodies of Ragged Top will make one of our foremost cyaniding districts. The insurance was about \$25,000, but the loss will exceed \$75,000. The plant was complete, containing crusher, two pair rolls, six solution tanks, ten 125-ton leaching tanks, with precipitation boxes and refinery. Several thousand dollars can be cleaned up from the ruins, as the precipitating room was on solid ground. O. N. Brown, the general manager, is waiting instructions from the main offices at Colorado Springs, Colo. It is expected that they will rebuild to better advantage and on a larger scale. S. A. E. Deadwood, Oct. 26.

#### UTAH.

##### BEAVER COUNTY.

In the O. K. group, near Frisco, it is reported, a cave has been found on the 300-foot level, the dome, floor and walls of which are copper ores.

##### BOX ELDER COUNTY.

The Sunflower M. Co. has been incorporated, with office at Salt Lake City; capital, \$300,000. J. R. Browning is president and O. Morris secretary and treasurer. The company owns the Sunflower Nos. 1, 2, 3, 4, 5 and 6 and Sunflower Extension Nos. 7, 8 and 9 in Clear Creek district.

##### JUAB COUNTY.

D. Lombard, J. A. Pierce, A. Jensen, J. C. Jensen and G. Swanson have incorporated the Sweetwater Con. M. Co., capital \$3000, and office in Eureka. The property consists of claims near Eureka under development.

##### SUMMIT COUNTY.

At the California mine, at Park City, the capacity of the concentrator will be doubled by installing additional tables, jigs and rolls.

##### WASHINGTON COUNTY.

Control of the Surprise group of copper-bearing claims at St. George has been bought by Park City, Tintic and Salt Lake investors. The buyers are said to have paid \$31,375 for the control to G. Adams of Eureka.

The Paymaster group at St. George has been bought by J. J. Mullin and A. J. Malloy for a London company.

##### WASHINGTON.

##### JEFFERSON COUNTY.

It is reported that J. Singer, representing New York people, has bought several free-milling gold propositions in the Olympic mountains, near Port Townsend, for, it is said, \$10,000 from J. Rice, J. J. Brown, D. M. Cook and M. Moran of Everett.

##### PIERCE COUNTY.

The Southern Pacific Co. is building seventy-five coke ovens at Carbonado. For fifteen years past the entire product of the Carbon Hill coal mines has been shipped to Oakland and San Francisco for use on the ferry boats and locomotives. The indications were that their output would have to be restricted when the Southern Pacific substituted petroleum for fuel. Mr. Davies, Supt. of the mine, suggested the manufacture of coke. The first battery of seventy-five ovens is nearing completion. At Wilkeson fifty more coke ovens are being built and thirty-three additional at Fairfax. These increases make nearly 300 ovens in this county.

##### SPOKANE COUNTY.

The Montezuma M. Co. has been incorporated at Spokane, capital \$375,000, by C. Hough, T. Hooker, G. W. Roche, A. S. Dibble and J. T. Person.

#### FOREIGN.

##### BRITISH COLUMBIA.

The contract for the Lenora smelter, which is to be erected at Osborne bay, opposite Mount Sicker, has been awarded to F. Sherbourne, of Victoria. Work of con-



Moctezuma, Sonora, Oct. 26.

CHARLES D. WALCOTT, director of the United States Geological Survey, is in San Francisco. He is personally inspecting the work of the irrigation survey in his charge and states that in addition to this the department has during the past sum-

**CAN CLEANING MACHINE.**—No. 685,000. Oct. 22, 1901. Wm. Munn, San Francisco, Cal., assigned to Alaska Packers' Association, San Francisco. This apparatus is designed to clean cans after they have been filled. The outsides of the cans are sometimes rusted and are often covered with adherent material which prevents their being properly soldered. This apparatus is designed to clean the cans in readiness for soldering, and it consists of a revolving brush, intermittently mov-

684,986.—EGG BEATER—A. Welsenback, Reedville,  
Or.

(—) Indicates every other week or monthly advertisements.

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| <b>A</b>                                   |        | <b>D</b>                                          |       | <b>K</b>                                     |       | <b>R</b>                                   |       |
| Adams, W. J.....                           | 14     | Dessau, S.....                                    | 9     | Kent Mill Co.....                            | 8     | Rand Drill Co.....                         | 9     |
| Almsworth & Sons, Wm.....                  | 14     | Detroit Leather Specialty Co.....                 | 10    | Keuffel & Esser Co.....                      | 15    | Redington & Co.....                        | 1     |
| Anderson Perforated Metal Co., Robert..... | 17     | Detroit Lubricator Co.....                        | 19    | Keystone Driller Co.....                     | 13    | Rose, I. Elmer.....                        | 14    |
| Akers, Wm. A.....                          | 14     | Dewey, Strong & Co.....                           | 10    | Knight & Co.....                             | —     | Richards, J. W.....                        | 14    |
| Allis-Chalmers Co.....                     | 2, 6   | Doble Co., A. Duer.....                           | 8, 11 | Krogh Mfg. Co.....                           | 7     | Rison Iron Works.....                      | 1, 4  |
| American Diamond Rock Drill Co.....        | 9      | Dobbs & Hicks.....                                | 14    | <b>L</b>                                     |       |                                            |       |
| American Engineering Works.....            | 18     | Donaldson & Co., A. M.....                        | 1     | Leffel & Co., James.....                     | 13    | Rix Compressed Air & Drill Co.....         | 9     |
| American Expansion Pulley Co.....          | 15     | Dow Pumping Engine Co., Geo. E.....               | 7     | Legg, R. G.....                              | 14    | Robins Conveying Belt Co.....              | 5     |
| American Industrial Publishing Co.....     | 15     | <b>E</b>                                          |       | Leschen, A., & Sons.....                     | 10    | Roebbing's Sons Co., John A.....           | 21    |
| American Oil Refinery Co.....              | 1      | Eby, Jno. D.....                                  | —     | Lewellyn Iron Works.....                     | 12    | Roesler & Hasslacher Chemical Co.....      | 1     |
| American Steel & Wire Co.....              | 1      | Edson Manufacturing Co.....                       | —     | Leyner, J. Geo.....                          | 9     | Rosenberger, A. F.....                     | 1     |
| Assessment Notices.....                    | 1      | Electric Wheel Co.....                            | 13    | Lietz Co., A.....                            | 14    | <b>S</b>                                   |       |
| Atlas Pipe Wrench Co.....                  | 16     | Electric, Railway & Mfrs Supply Co.....           | 2     | Link-Belt Machinery Co.....                  | 8     | San Francisco Novelty & Plating Works..... | 10    |
| <b>B</b>                                   |        | Erierson Telephone Co.....                        | 2     | "Locomotive" Company of the Pacific.....     | 14    | San Francisco Pioneer Screen Works.....    | 2     |
| Baird & Co., Henry Carey.....              | 15     | Eureka Co.....                                    | 1     | Luckhardt Co., C. A.....                     | 14    | Sands & Wood.....                          | 11    |
| Baker & Hamilton.....                      | 19, 21 | Evans & Co., C. H.....                            | 7     | Lunkenheimer Co.....                         | 19    | Sanford, Albert B.....                     | 2     |
| Baker Iron Works.....                      | 16     | Excelsior Redwood Co.....                         | 7     | <b>M</b>                                     |       |                                            |       |
| Bardwell, G. D.....                        | 14     | <b>F</b>                                          |       | Macbeth & Co., James.....                    | —     | Santa Fe Railroad.....                     | 2     |
| Barnhart, Geo. W.....                      | 20     | Falkenau, Louis.....                              | 14    | Macdonald, Bernard.....                      | 14    | Schaw, Ingram, Batchelor & Co.....         | 10    |
| Bartlett & Co., C. O.....                  | 19     | Fassett, Charles M.....                           | 14    | Madison, Bruce & Sellers.....                | 21    | School of Practical Mining.....            | 14    |
| Bauer Lamp & Reflector Co.....             | 15     | Finn, Oliver B.....                               | 14    | Main Belting Co.....                         | 17    | Selby Smelting & Lead Co.....              | 5     |
| Becker, Christian.....                     | 19     | Florence & Cripple Creek Railroad Co.....         | 1     | Manning's Assay Office.....                  | 14    | S. H. Supply Co.....                       | 1     |
| Bell, New.....                             | 19     | For Sale.....                                     | 1     | Marion Steam Shovel Co.....                  | 20    | Simons, Ernest H.....                      | 30    |
| Bennjamin, E. H.....                       | 14     | Freier, C. C.....                                 | 16    | Marshutz & Cantrell.....                     | 17    | Simonds Saw Co.....                        | 1     |
| Best Manufacturing Co.....                 | 3      | Freier & Son.....                                 | 19    | McFarlane & Co.....                          | 17    | Situations Wanted.....                     | 1     |
| Billin & Co., Chas. E.....                 | 1      | Frue Vanning Machine Co.....                      | 22    | Meredith, Wynn.....                          | 14    | Smith & Co., F. L.....                     | 20    |
| Boesch Lamp Co.....                        | 13     | Fueller, C. M.....                                | 14    | Michigan College of Mines.....               | 2     | Smith Co., S. Morgan.....                  | 13    |
| Bradley Pulverizer Co.....                 | 7      | Fulda Tank Manufactory.....                       | —     | Midland Terminal Railway Co.....             | 2     | Smith & Co., Francis.....                  | —     |
| Braun & Co., F. W.....                     | 18     | <b>G</b>                                          |       | Midvale Steel Co.....                        | 10    | Smooth-On Mfg. Co.....                     | 21    |
| Brotherhood Hot Blast Smelting Co.....     | 8      | Gardner Electric Drill & Machinery Co.....        | 8     | Mine & Smelter Supply Co.....                | 7     | Standard Oil Co.....                       | 2     |
| Burlington & St. Helms Rope Co.....        | 1      | Garlock Packing Co.....                           | 21    | Miners' Assay Office.....                    | 14    | State Ore Sampling Co.....                 | 14    |
| Buxwell, J. S.....                         | 22     | General Concentrates Co.....                      | 18    | "Mining Investor".....                       | 1     | Stevens, Ralph E.....                      | 14    |
| Bucyrus Dredge.....                        | 17     | General Electric Co.....                          | 20    | Montague & Co., W. W.....                    | 2     | Stillwell-Bierce & Smith-Valle Co.....     | —     |
| Burlingame & Co., E. E.....                | 14     | Globe Iron Works.....                             | 8     | Moore & Co., Chas. C.....                    | 17    | Stockton Business College.....             | 1     |
| Burnham-Standeford Co.....                 | 2      | Goodyear Rubber Co.....                           | 2     | Morris, H. D. & H. W.....                    | 20    | Strout & Son, W. H.....                    | 14    |
| Burt Mfg. Co.....                          | 14     | Gold & Silver Extraction Co. of America, Ltd..... | 5     | <b>N</b>                                     |       |                                            |       |
| Burton, Howard E.....                      | 14     | Grimm, Frank W.....                               | 17    | National Iron Works.....                     | —     | Sturtevant Mill Co.....                    | 15    |
| <b>C</b>                                   |        | Gutta Percha Rubber & Mfg. Co.....                | —     | Neill, James W.....                          | 14    | Sullivan Machinery Co.....                 | 9     |
| California Debris Commission.....          | 2      | <b>H</b>                                          |       | Neweta Metallurgical Works.....              | 14    | <b>T</b>                                   |       |
| California Dredging Co.....                | 1      | Haas, Baruch & Co.....                            | 15    | New Era Machinery Co.....                    | 21    | Tanana Mining Co.....                      | 1     |
| California Electrical Works.....           | 8      | Had, Edward L.....                                | 14    | New Process Raw Hide Co.....                 | 21    | Taylor Iron & Steel Co.....                | 19    |
| California Perforating Screen Co.....      | 2      | Halldie Ropeway.....                              | 22    | Ogden Assay Co.....                          | 14    | Taylor & Co., P. T.....                    | 16    |
| California Vigor Powder Co.....            | 22     | Hanks, Abbot A.....                               | 14    | Oregon Short Line Railroad.....              | —     | Thompson Mining Co.....                    | 1     |
| California Wire Works.....                 | 22     | Harrigan, Jno.....                                | 14    | Oriental Gas Engine Co.....                  | —     | Trenton Iron Co.....                       | 14    |
| Cameron Steam Pump Works.....              | 13     | Hartay, A. E.....                                 | 14    | Otis, McAllister & Co.....                   | —     | Tyler, S. W.....                           | —     |
| Canton Steel Co.....                       | 9      | Heald's Business College.....                     | 2     | <b>O</b>                                     |       |                                            |       |
| Cary Spring Works.....                     | 13     | Hendry & Bolthoff Mfg. & Supply Co.....           | 16    | Pacific Coast Rubber Co.....                 | 8     | <b>U</b>                                   |       |
| Chinn-Beretta Optical Co.....              | —      | Hendy Machine Works, Joshua.....                  | 13    | Pacific Coast Smelting & Refining Works..... | 22    | Union Gas Engine Co.....                   | 15    |
| Chrome Steel Works.....                    | 20     | Herche Bros.....                                  | 14    | Pacific Engineering Co.....                  | 14    | Union Iron Works.....                      | —     |
| Clot & Crist Machine Co.....               | 2      | Hersey, Clarence.....                             | 14    | Pacific Refining & Roofing Co.....           | 18    | Union Photo-Engraving Co.....              | 20    |
| Colorado Iron Works Co.....                | 5, 11  | Hiertz & Son.....                                 | 13    | <b>P</b>                                     |       |                                            |       |
| Colorado Lamp Co.....                      | —      | Holden, S. P.....                                 | 14    | Pacific Coast Rubber Co.....                 | 8     | <b>V</b>                                   |       |
| Colorado Midland Railway.....              | 10     | Hooper & Co., C. A.....                           | 7     | Pacific Coast Smelting & Refining Works..... | 22    | Van Der Natlien, A.....                    | 14    |
| Colorado & Southern Railway.....           | 10     | Hoskins & Co., Wm.....                            | 13    | Pacific Engineering Co.....                  | 14    | Van Wagonen, Theo. F.....                  | 14    |
| Cooper, C. A.....                          | 14     | Hunt, A. M.....                                   | 14    | Pacific Refining & Roofing Co.....           | 18    | Vulcan Iron Works.....                     | 13    |
| Copper King, Ltd.....                      | 22     | Huntington, F. A.....                             | 21    | Pacific Tank Co.....                         | —     | <b>W</b>                                   |       |
| Cory, C. L.....                            | 14     | Hunter, D. B.....                                 | 21    | Paraffine Paint Co.....                      | 5     | Waratah Minerals Co.....                   | —     |
| Crane Co.....                              | 20     | <b>I</b>                                          |       | Parke & Lacy Co.....                         | 22    | Weber Gas & Gasoline Engine Co.....        | 21    |
| Crocker-Wheeler Co.....                    | 20     | Ingersoll-Sergeant Drill Co.....                  | 8     | Paul, Earl H.....                            | 14    | Weigels Pipe Works.....                    | 17    |
| Currie, J. W.....                          | 14     | Irving & Co., James.....                          | 8     | Pennington Sons, Inc., Geo. W.....           | 5     | Western Chemical Co.....                   | 20    |
| <b>D</b>                                   |        | Irving & Co., James.....                          | 8     | Perez, Richard A., Inc., Geo. W.....         | 14    | Westinghouse Electric & Mfg. Co.....       | 4     |
| Davis Iron Works Co., F. M.....            | 16     | Jackson Drill & Mfg. Co.....                      | 9     | Peterson, L.....                             | 14    | Wetherill Separating Co.....               | 15    |
| Dearborn Drug & Chemical Works.....        | 15     | Jackson Machine Works, Byron.....                 | 17    | Phillips & Co., Alvin.....                   | 14    | Wigmore & Sons, John.....                  | 21    |
| Denver & Grand Central Plating Works.....  | 10     | Jeffrey Mfg. Co., The.....                        | 9     | Phillips Rock Drill Co.....                  | 9     | Willietta Mining & Milling Co.....         | 2     |
| Denver Engineering Works.....              | 10     | Jeanesville Iron Works Co.....                    | —     | Pneumatic Cyanide Process Co.....            | 2     | Wimmer, Geo.....                           | 15    |
| Denver Fire Clay Co.....                   | 15     | Jessop & Sons, Ltd., Wm.....                      | 8     | Fosilethwaite, R. H.....                     | 14    | Wohler, Bartling Suc's.....                | 14    |
| Denver & Rio Grande R. R.....              | —      | Jumper Gold Syndicate.....                        | 1     | Prescott & Eastern Railroad.....             | 12    | Wool Henry E.....                          | 4     |
| <b>E</b>                                   |        | <b>J</b>                                          |       | Putman, H. J. & Co.....                      | 17    | Woodbury, Geo. E.....                      | 4     |
| Dessau, S.....                             | 9      | Jackson Drill & Mfg. Co.....                      | 9     | <b>Q</b>                                     |       |                                            |       |
| Detroit Leather Specialty Co.....          | 10     | Jackson Machine Works, Byron.....                 | 17    | Quick, Jno. W.....                           | 2     | <b>Y</b>                                   |       |
| Detroit Lubricator Co.....                 | 19     | Jeffrey Mfg. Co., The.....                        | 9     | Yawger, I. C.....                            |       |                                            |       |
| Dewey, Strong & Co.....                    | 10     | Jeanesville Iron Works Co.....                    | —     | Yuba Con. Gold Mining Co.....                |       |                                            |       |
| Doble Co., A. Duer.....                    | 8, 11  | Jessop & Sons, Ltd., Wm.....                      | 8     |                                              |       |                                            |       |
| Dobbs & Hicks.....                         | 14     | Jumper Gold Syndicate.....                        | 1     |                                              |       |                                            |       |
| Donaldson & Co., A. M.....                 | 1      |                                                   |       |                                              |       |                                            |       |
| Dow Pumping Engine Co., Geo. E.....        | 7      |                                                   |       |                                              |       |                                            |       |
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## Latest Market Reports.

SAN FRANCISCO, Oct. 31, 1901.

**SILVER.**—Per oz., Troy: London, 26½d (standard ounce, 925 fine); New York, bar silver, 57½c (1000 fine); San Francisco, 57½c; Mexican dollars, 45½c San Francisco, 47½c New York.

**COPPER.**—New York: Lake, 1 to 3 casks, \$17.25; carload lots, \$17.00; Electrolytic, 1 to 3 casks, \$16.75; carload lots, \$16.62½; Casting, 1 to 3 casks, \$16.60; carload lots, 16.50. San Francisco: 18. Mill copper plates, 20c; bars, 22@23c. London: £63 17s 6d per ton.

**LEAD.**—New York, \$4.37½; Salt Lake City, \$4.00; St. Louis, \$4.40; San Francisco \$4.90, carload lots; 5½c 1000 to 4000 lbs.; pipe 6, sheet 6½, bar 5½c; pig, \$5.25. London, £11 8s 9d per ton=2.46 cents per lb.

**SPELTER.**—New York, \$4.20; St. Louis, \$3.75; London, £16 2s 6d per ton =3.58½ cts. per lb.; San Francisco, ton lots, 5½c; 100-lb lots, 6c.

**ANTIMONY.**—New York, Cookson's, 10c; Hallett's, 9c; San Francisco, 1000-lb. lots, 10c; 300 to 500 lbs., 11c; 100-lb. lots, 13@15c.

**IRON.**—Pittsburg, Bessemer pig, \$16.00; gray forge, \$14.00; San Francisco, bar, per lb., 2.65c in small quantities.

**STEEL.**—Bessemer billets, Pittsburg, \$24; open hearth billets, \$26.50; San Francisco, bar, 10 to 12c per lb.

**TIN.**—New York, pig, \$27.50; San Francisco, ton lots, 28c; 1000 lbs., 28½c; 500 lbs., 28½c; 200 lbs., 28½c; less, 29c; bar tin, \$3.24c.

**QUICKSILVER.**—New York, \$51.00 large lots; London, £9 2s 6d; San Francisco, local, \$47.50 per flask of 76½ lbs.; Export, \$45.00.

**MAGNESIUM.**—New York, \$2.90 per lb.; San Francisco, \$3.75.

**ZINC.**—San Francisco, 5½c; slab, 5½c; bar, 7c; zinc dust, N. Y., 8c.

**BABBITT METAL.**—San Francisco, No. 1, 10c.

**ALUMINUM.**—New York, No. 1, 99% pure ingots, 35c; No. 2, 90%, 30c to 35c.

**SOLDER.**—Half-and-half, 100-lb. lots, 18c; San Francisco, Plumbers', 100-lb. lots, 15.25c.

**PHOSPHORUS.**—F. o. b. New York 50@60c per lb.

**ASSAY LITHARGE.**—San Francisco, 10c per lb., small lots.

**PLATINUM.**—San Francisco, crude, \$19 per oz.; New York, \$20.50 per Troy oz.

**BISMUTH.**—New York, \$3.22 50-lb lots; San Francisco, \$2.50 to \$2.75 per lb.

**FERRO-MANGANESE.**—Pittsburg, 80%, domestic, \$58.50, large lots.

**TUNGSTEN.**—New York, \$1.95c; San Francisco, \$1.15.

**FERRO-TUNGSTEN.**—New York, 37%, 32c; San Francisco, 65c (60%).

**POWDER.**—F. o. b. San Francisco: No. 1, 70% nitro-glycerine, per lb., in carload lots, 15½c; less than one ton, 17½c. No. 1\*, 60%, carload lots, 13½c; less than one ton, 15½c. No. 1\*\* 50%, carload lots, 11½c; less than one ton, 13½c. No. 2, 40%, carload lots, 10c; less than one ton, 12c. No. 2\*, 35%, carload lots, 9½c; less than one ton, 11½c. No. 2\*\* 30% carload lots, 9c; less than one ton, 11c. Black blasting powder in carload lots, minimum car 725 kegs, \$1.50 per keg; less car lots, \$2 per keg.

**CAPS.**—3x, \$5.50 per 1000; 4x, \$6.50; 5x, \$8; Lion, \$9, in lots not less than 1000.

**FUSE.**—Triple tape, \$3.60 per 1000 feet; double tape, \$3.00; single tape, \$2.65; Hemp, \$2.10; Cement No. 2, \$3.00; Cement No. 1, \$2.65, in lots of 3000 feet and up.

**CANDLES.**—Granite 6s, 16 oz., 40s., 9½c per set; 14 oz., 40s., 5½c.

**OILS.**—Linsed, pure, boiled, bbl., 74c; cs., 79c; raw, bbl., 74c; cs., 78c. Deodorized Stove Gasoline, bulk, 14½c; do., cs., 20½c; 86° Gasoline, bulk, 20c; do., cs., 26c; 63° Naphtha or Benzine, deodorized, in bulk, per gal., 13½c; do., in cs., 19½c; Lard Oil, Extra Winter Strained, bbl., 75c; cs., 80c; No. 1 bbl., 50c; cs., 55c. Neatsfoot Oil, coopers' bbls., 60c; cs., 65c; No. 1 bbl., 50@52½c; cs., 55@57½c.

**CHEMICALS.**—Cyanide of potassium, 98%-99%, jobbing, 31½@32½c per lb.; carloads, 29@30c; in 10-lb. tins, 40c; sulphuric acid, in carboys, 66½ B, 2c per lb.; soda ash, \$1.90 per 100 lbs.; hyposulphite of soda, 24@30c per lb.; blue vitriol, 5½@6½c per lb.; borax, concentrated, 7@8c per lb.; chlorate of potash, 12@13c; roll sulphur, 6c; alum, \$1.90@2.00; flour sulphur, French, 24@2½c; California refined, 14@2c; nitric acid, in carboys, 8c per lb.; caustic soda, in drums, 3@4c per lb.; Cal. s. soda, bbls., \$1.00; sds, 95c per 100 lbs.; chloride of lime, spot, \$2.50@2.60; nitrate of potash, in kegs, 8c; caustic potash, 10c in 40-lb. tins.

**COAL.**—San Francisco, coast, yard prices: Wellington, \$9; Seattle, \$7.00; Coos Bay, \$5.50; Southfield, \$9.00. Cargo lots, Eastern and foreign: Wallsend, \$8.00; Brymbo, \$7.50; Pennsylvania, hd., \$14.00; Scotch, \$8; Cumberland, \$12; Cannel, \$9.50; Welsh Anthracite, \$12.00; Rock Springs, \$8.50; Colorado Anthracite, \$14.50. Coke, \$16 per ton in bulk; \$18 in sacks.

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Competent Ore Sampler desires position; can take entire charge, handle men; understands all measures, panning and all details; can assist in office work; quick with figures; sober and pay strict attention to business; fifteen years' Colorado experience. Sickness in family reason for desiring change. References. Address W. G. B., care this office.

Expert Cyanider and Matte Smelter, also experienced in quartz mining, milling, chlorination (O K chemist and assayer), wants to take charge of, or design, plant, develop or report on (incl survey) property. Would accept temporarily subordinate position on a shift mill, or furnace boss, or in laboratory. Experience in Mexico. All references. "Practical," this office.

Young Mining Engineer desires position. Scientific and practical training, six years' experience. Mine and surface surveying; neat and accurate draughtsman; assaying, etc. Accustomed to handle men. Excellent references. Address Box 92, Mining and Scientific Press office.

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**MINING ENGINEER,** graduate Mass. Inst. Tech., with thirteen years' experience as minor and surface surveying; neat and accurate draughtsman; superintendent of coal mine, washer and coke oven plant and railroad in South for six years; in charge of zinc property in Missouri; familiar with concentrating methods; at present in charge of cyanide operations of tailings pile in California, desires position with reliable company. Open for engagement after October 15. Address S. J. M., care Mining and Scientific Press.

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## ASSESSMENT NOTICES.

**THE CALIFORNIA DREDGING COMPANY.**—Principal place of business, 120 Sutter Street, San Francisco, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 22nd day of October, 1901, an assessment (No. 3) of 10 cents per share was levied upon the capital stock of the corporation, payable immediately in gold coin, to the secretary of the corporation, at the office of the company, 120 Sutter Street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on MONDAY, the 23rd day of November, 1901, will be delinquent and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 10th day of December, 1901, to pay the delinquent assessment, together with the cost of advertising and expenses of sale.

SAM. W. CHEYNEY, Secretary.  
120 Sutter Street, San Francisco, California.

**AMERICAN OIL AND REFINERY COMPANY.**—Location of principal place of business, San Francisco, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 21st day of October, 1901, an assessment of five (5) cents per share was levied upon all the subscribed capital stock of the said corporation, payable immediately to J. C. Anthony, secretary of said corporation, at its office, at room No. 323 of the Parrott building, Nos. 825 to 855 Market Street, in the City and County of San Francisco, State of California.

Any stock upon which this assessment shall remain unpaid on the 30th day of November, 1901, will be delinquent and advertised for sale at public auction; and, unless payment is made before, will be sold on MONDAY, the 23rd day of December, 1901, to pay the delinquent assessment, together with costs of advertising and expenses of sale.

By order of the Board of Directors,

J. C. ANTHONY, Secretary.  
Office—Room 323, Parrott building, Nos. 825 to 855 Market Street, San Francisco, California.

**TANANA MINING COMPANY.**—LOCATION OF principal place of business, San Francisco, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 30th day of September, 1901, an assessment (No. 4) of ten cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, Room 801 of the Claus Spreckels Building, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 4th day of November, 1901, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 2nd day of December, 1901, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors,

EDWARD H. STERNES, Secretary.  
Office—Room 801 Claus Spreckels Building, San Francisco, California.

**THE THORPE MINING COMPANY.**—Location of principal place of business, San Francisco, California; location of works, Fourth Crossing, Calaveras County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 8th day of October, 1901, an assessment (No. 1) of one (1) cent per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 632 Sacramento Street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 16th day of November, 1901, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 9th day of December, 1901, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors,

A. F. FREY, Secretary.

Office—632 Sacramento Street, San Francisco, California.

**YUBA CONSOLIDATED GOLD MINING COMPANY.**—Location of principal place of business, San Francisco, California; location of works, Nevada County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 12th day of October, 1901, an assessment (No. 4) of three cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin to the secretary, at the office of the company, Room 801 of the Claus Spreckels Building, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 18th day of November, 1901, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 18th day of December, 1901, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors,

EDWARD H. STERNES, Secretary.

Office—Room 801, Claus Spreckels Building, San Francisco, California.

## NOTICE.

NOTICE IS HEREBY GIVEN, that pursuant to written consent of the holders of more than two-thirds of the capital stock of THE JUMPER GOLD SYNDICATE OF CALIFORNIA, LIMITED, a corporation organized under the laws of the State of California, and also pursuant to a resolution of the Board of Directors of said corporation, the principal place of business of said corporation has been removed from the City and County of San Francisco, State of California, to the Jumper Mine, in the County of Tuolumne, in said State of California. (Signed) WILLIAM ADAM, Secretary of The Jumper Gold Syndicate of California, Limited.

Dated San Francisco, October 25th, 1901.

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THE CALIFORNIA DEBRIS COMMISSION, having received applications to mine by the hydraulic process from N. Gilman, in the American House Mine, at the American House, Plumas Co., to deposit tailings in a ravine below the mine; from Jas. A. Modglin, in the Old Gardiner's Point Diggings, near Port Wine, Sierra Co., to deposit tailings in Saw Mill Ravine; from the California Company, in the North Hill Placer Mine, near Milton, Calaveras Co., to deposit tailings in Rich Gulch; and from L. V. Tefft, in the Lone Star Mine, near Gremsburg, Plumas Co., to deposit tailings in Jackson Creek, gives notice that a meeting will be held at Room 59, Flood Building, San Francisco, Cal., on November 11, 1901, at 1:30 P. M.

THE CALIFORNIA DEBRIS COMMISSION, having received applications to mine by the hydraulic process from the Calaveras Mining, Water & Power Co., in the Johnston and Scott Hill Mines, near San Andreas, Calaveras Co., to deposit tailings in Willow Creek; from Chas. Hilton, in the Calaveritas Hill Mine, at Calaveritas, Calaveras Co., to deposit tailings in gulches draining into O'Neill and San Antonio Creeks; and from Manuel Leal and A. Rose, in the South Honcut Mine, in Yuba Co., near Bangor, to deposit tailings in South Honcut Creek, gives notice that a meeting will be held in Room 59, Flood Building, San Francisco, Cal., on Oct. 28, 1901, at 1:30 P. M.



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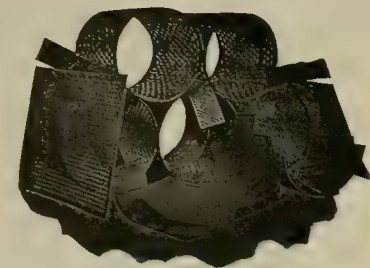


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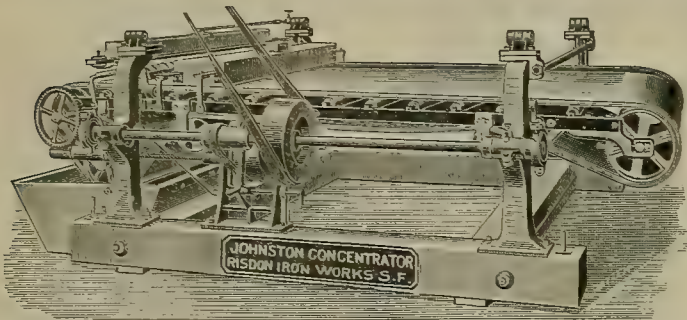
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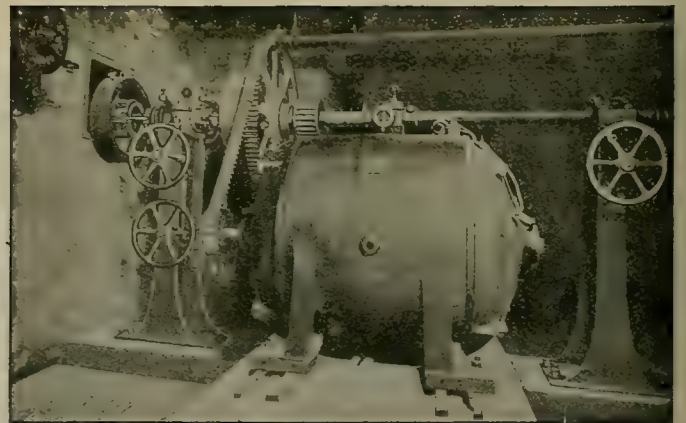
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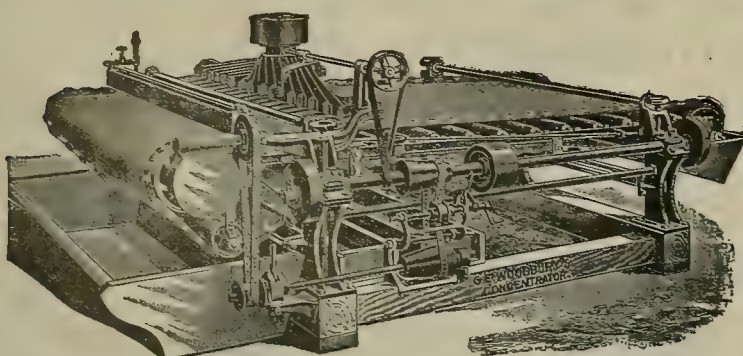
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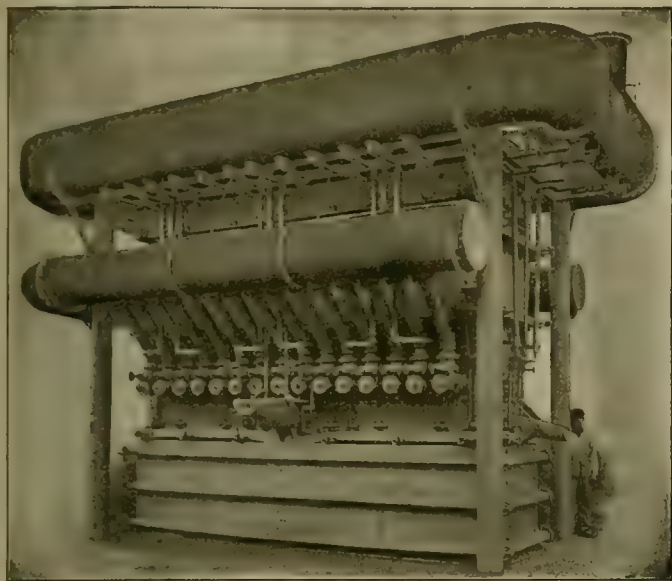
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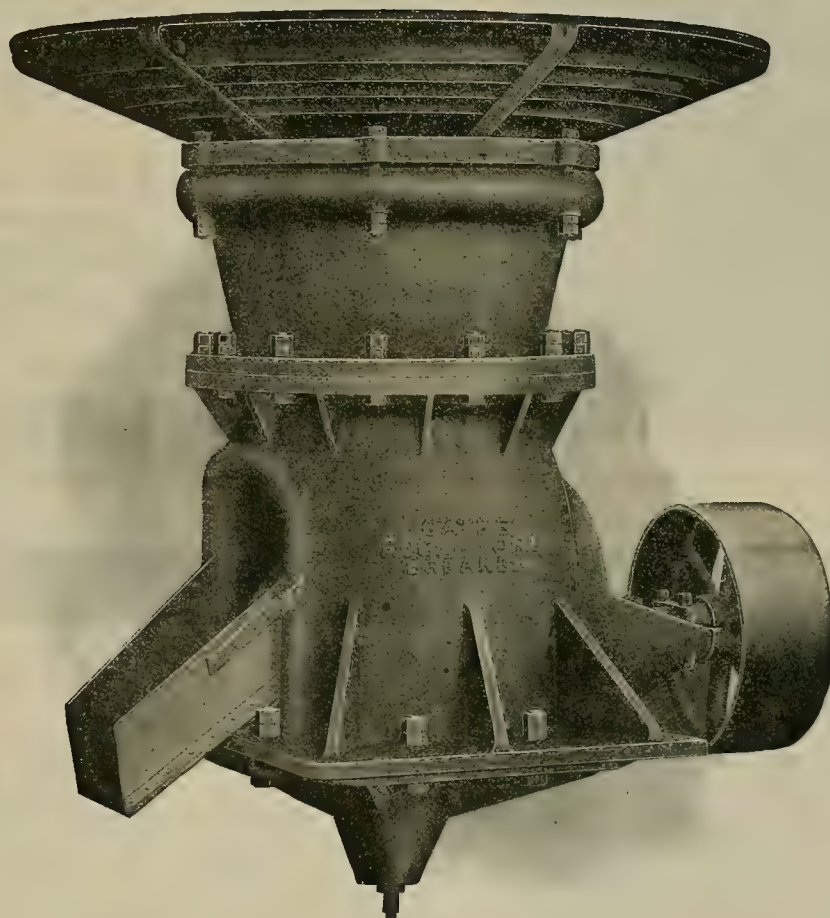
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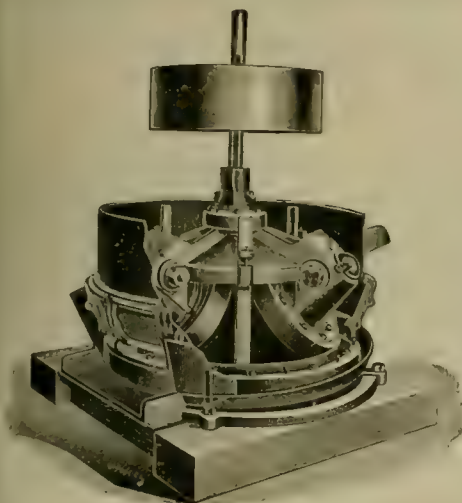
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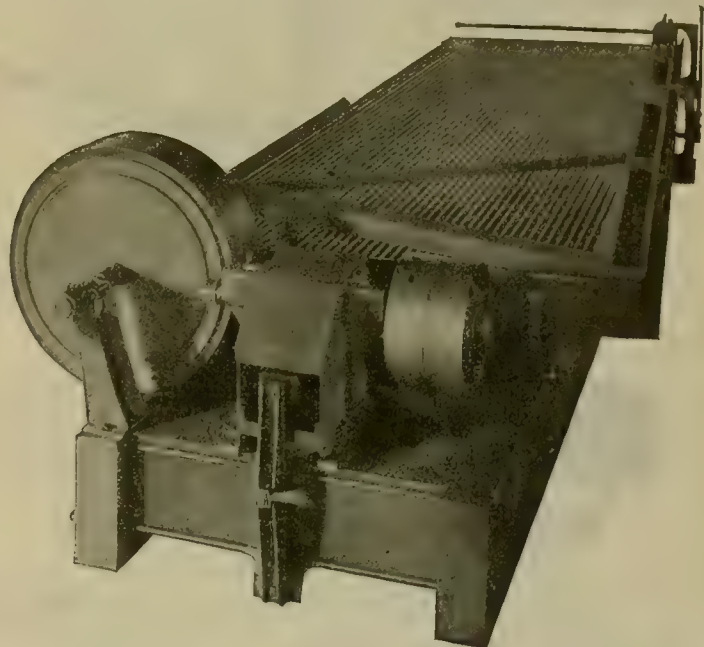
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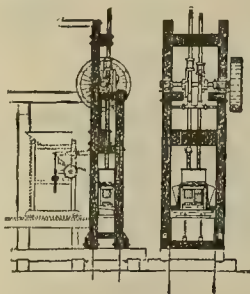
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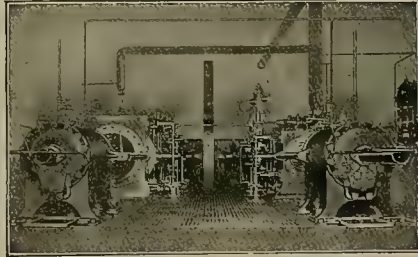
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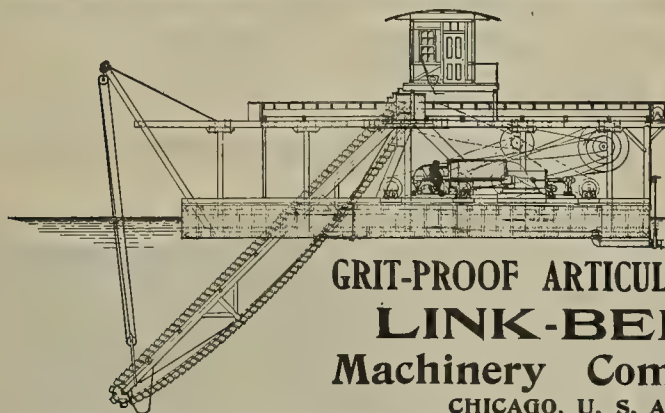
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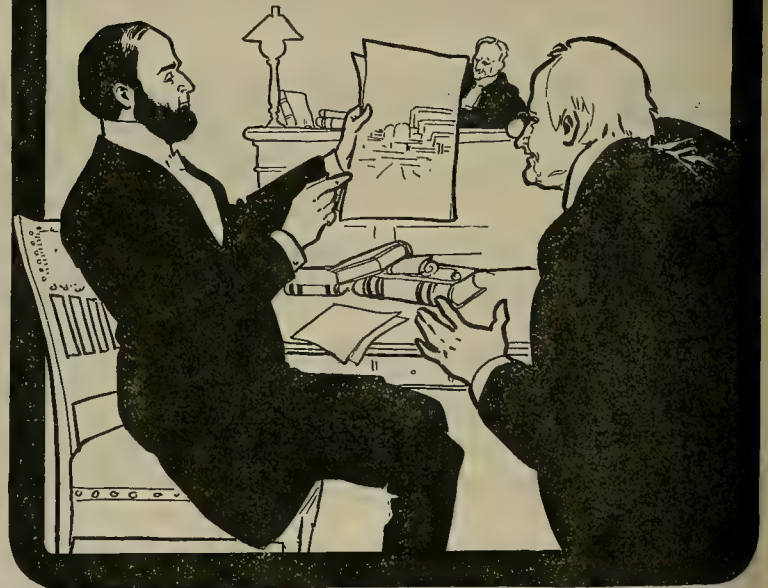
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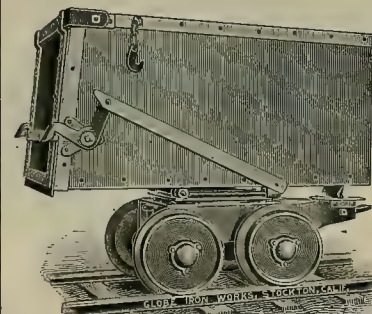
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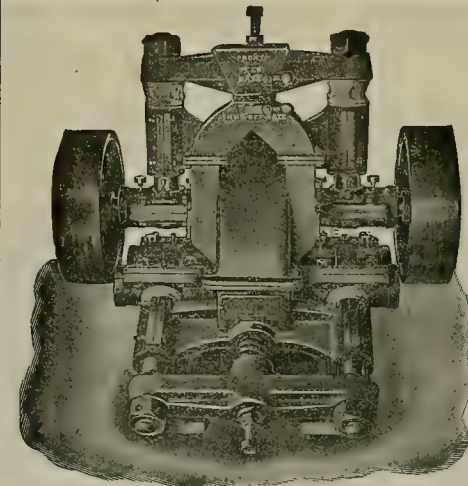
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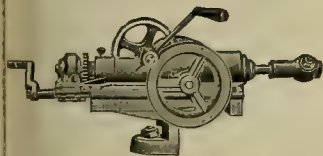
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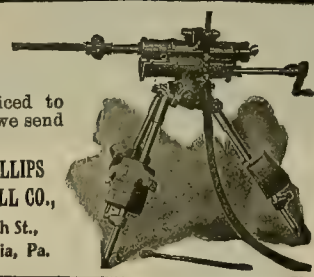
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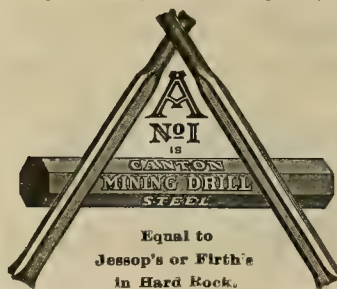
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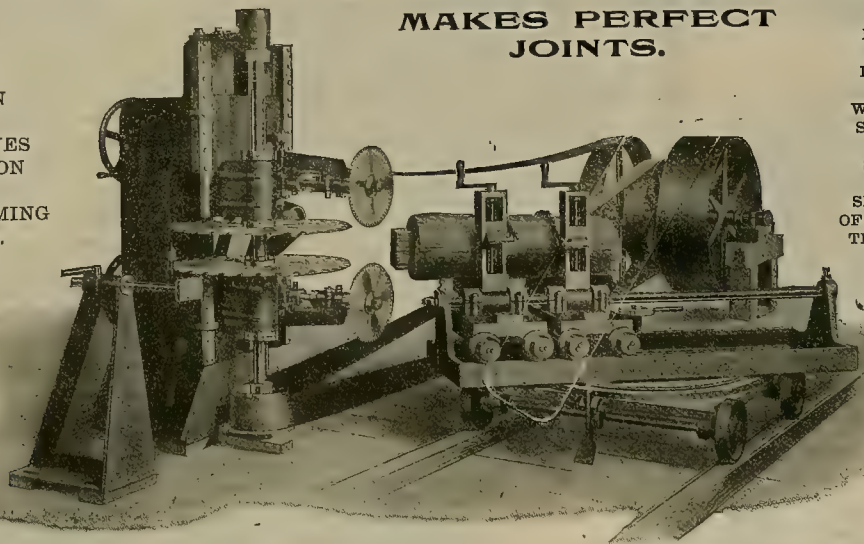
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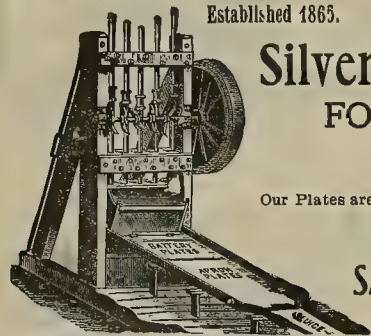
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The Pelton - Doble Litigation.

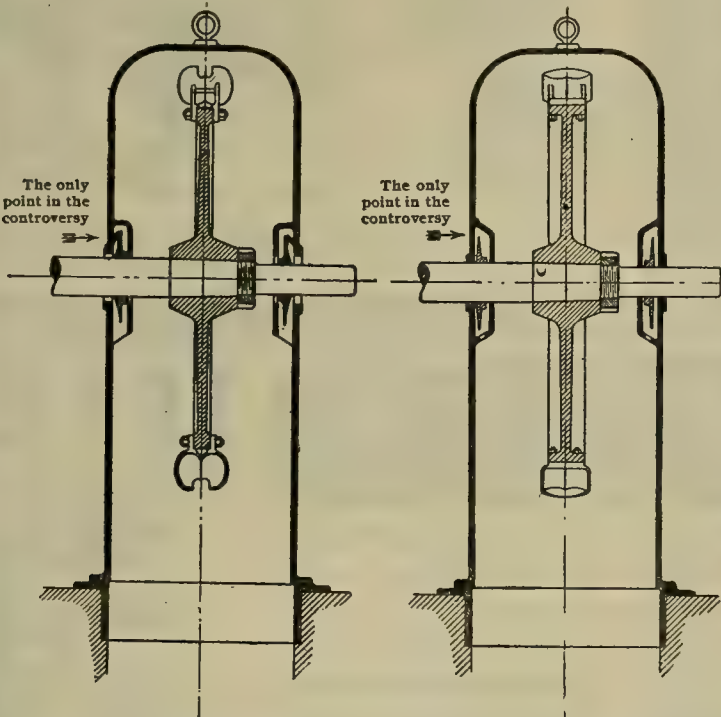
Those who know "Doble Wheels" will not use "Peltons."
The Pelton Water Wheel Company has awakened to a realization of this fact. It has found its wheels widely replaced by "Dobles," and its prestige gone.
Has it tried to demonstrate that the public is mistaken—that the "Pelton" is a superior wheel?
No.
Why?
Because, when put beside a "Doble Wheel," the "Pelton" has always shown far less efficiency. The Pelton manufacturers want no more comparative tests.
What was there left to do?
Happy idea! Bring an infringement suit. That must last a long time, and in the meantime—so

our ex-competitors calculated—they might deter the public from buying "Doble Wheels" by threats of suits for damages.

So the Pelton Water Wheel Company filed a complaint against Abner Doble Company, based on information and belief, and not under oath, to enjoin the use of centrifugal discs, which prevent water from escaping from the housing along the shaft of the wheel.

We will not try our case here, but call attention, however, to the following facts:

- FIRST—The suit in no way affects the Doble bucket.
- SECOND—The device complained of is one first patented by William A. Doble, and not used by Abner Doble Company since before the Pelton Company secured its patent, because superseded by our present and much better contrivance.
- THIRD—Our present device is wholly dissimilar to that of the Pelton Company.

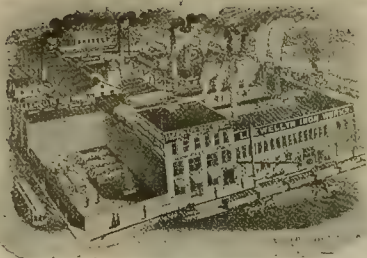


W. A. DOBLE
PATENT No. 619,148; DATED FEB. 7, 1899.
SERIAL No. 884,343; FILED DEC. 29, 1897.
LAST USED, JANUARY, 1899.

PELTON WATER WHEEL CO.
PATENT No. 833,962; DATED SEPT. 26, 1899.
SERIAL No. 892,733; FILED OCT. 5, 1898.

See the above cuts of the OLD Doble and Pelton patents, together with significant dates.
Will the public be bluffed in this way?
We will guarantee purchasers of "Doble Wheels" against infringement suits.

ABNER DOBLE COMPANY,
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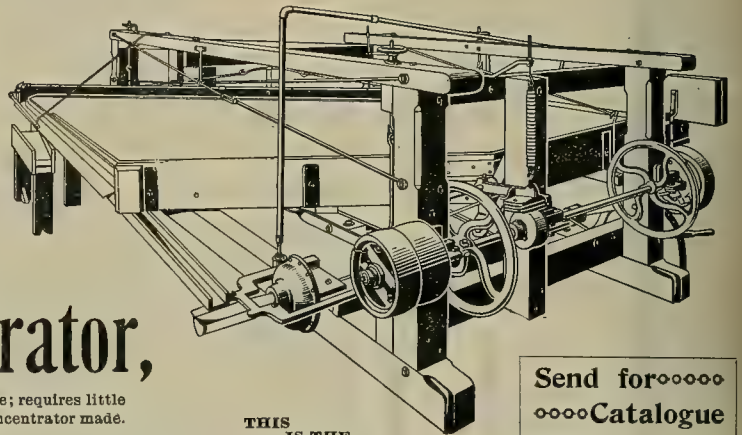
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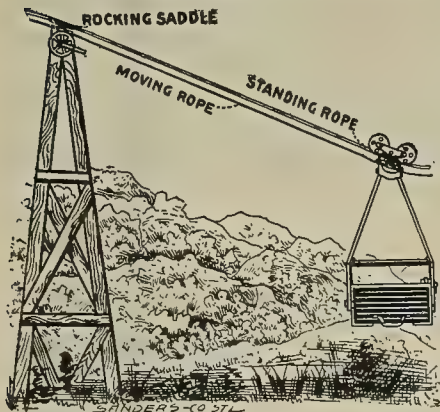
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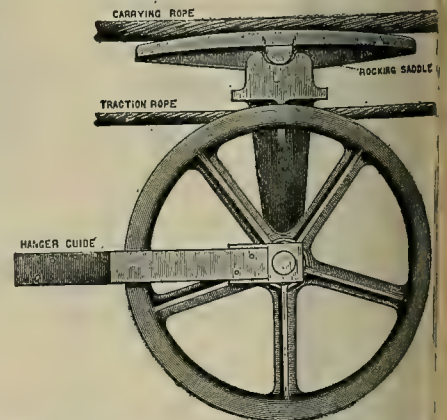
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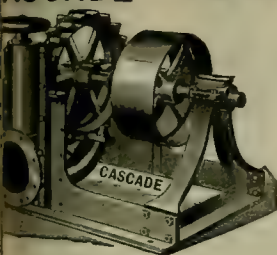


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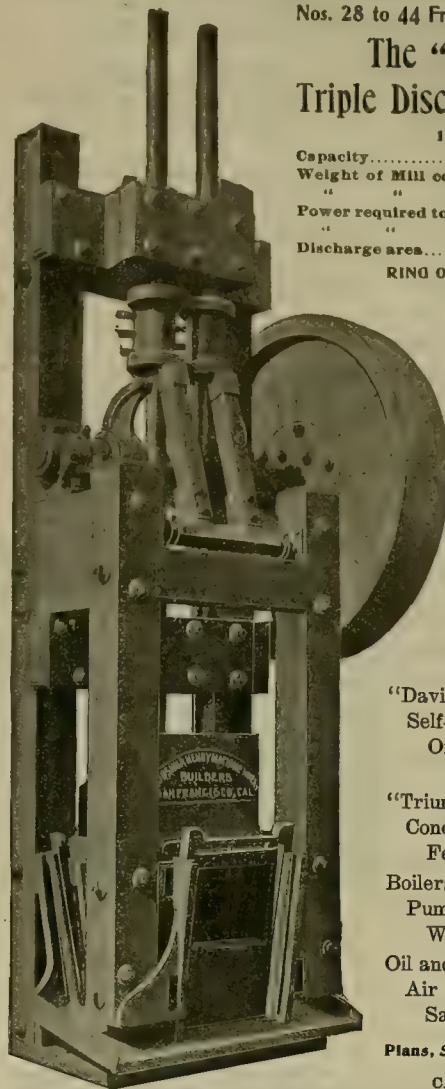
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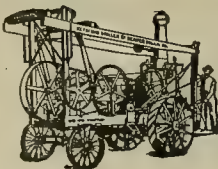
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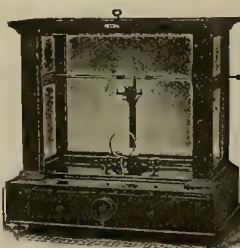
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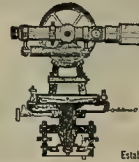
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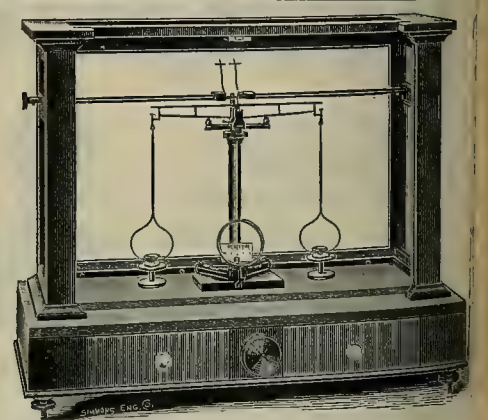
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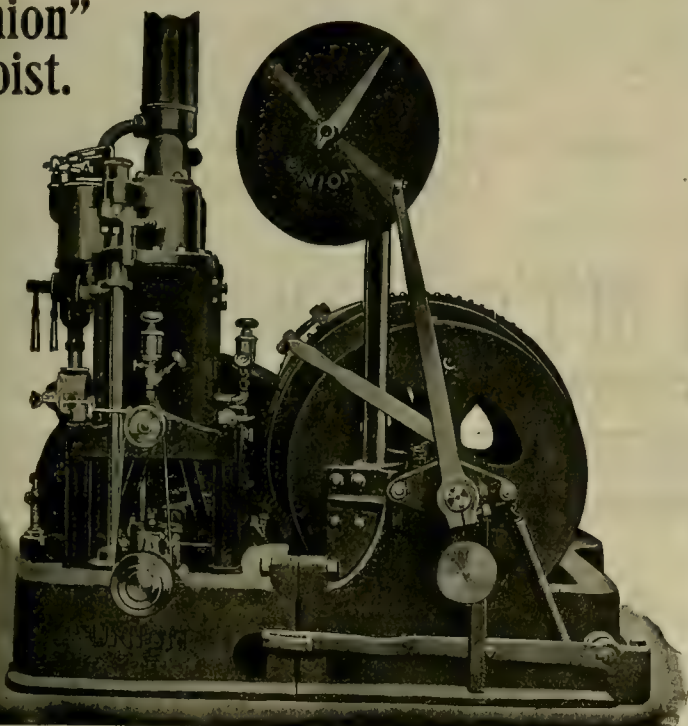
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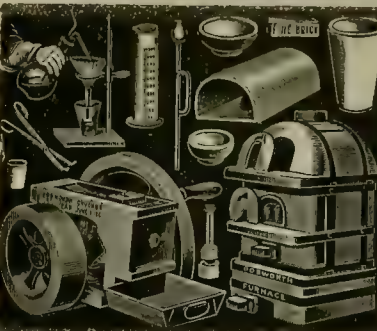
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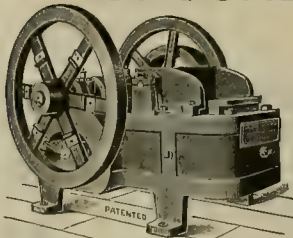
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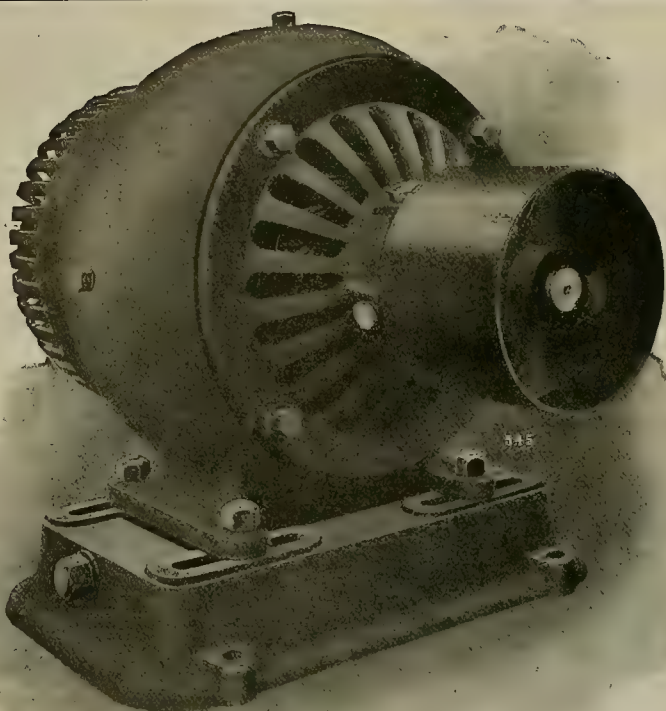
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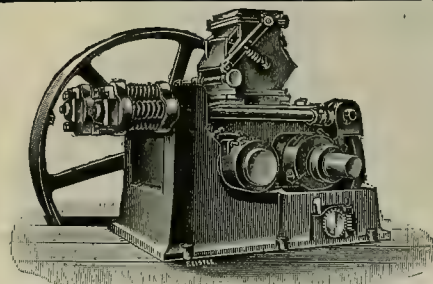
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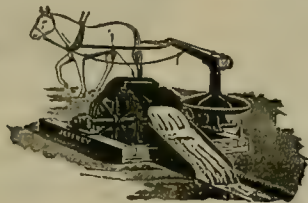


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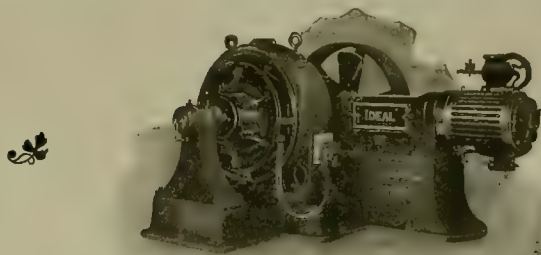
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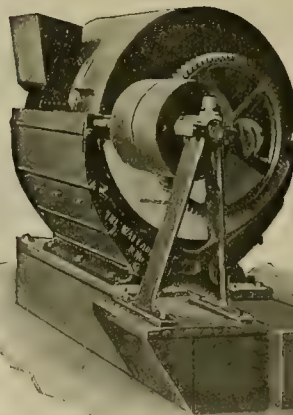
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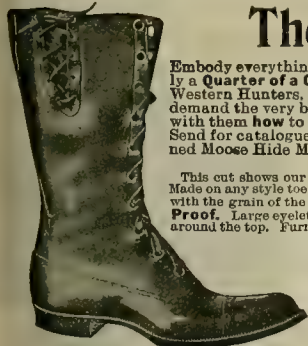
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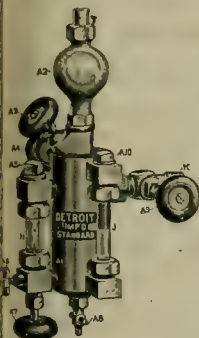
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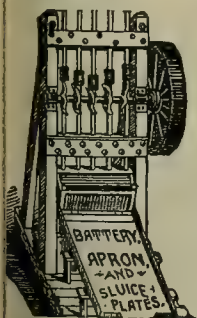


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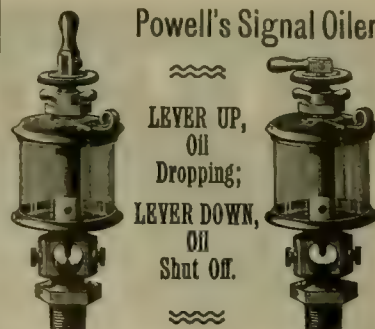


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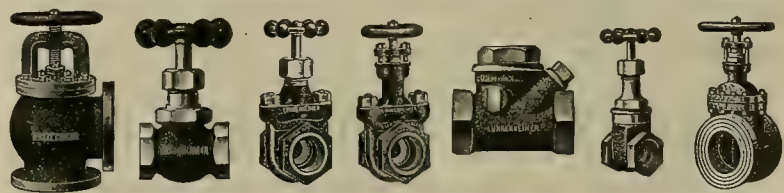
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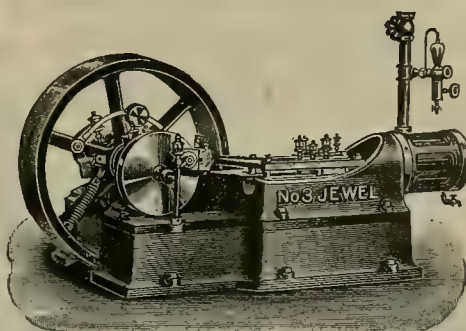
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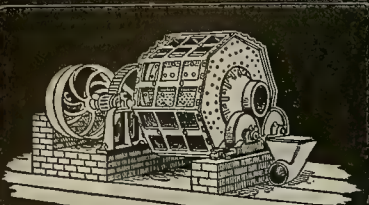
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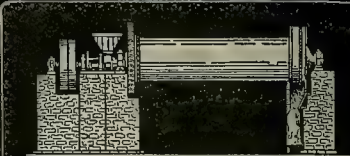
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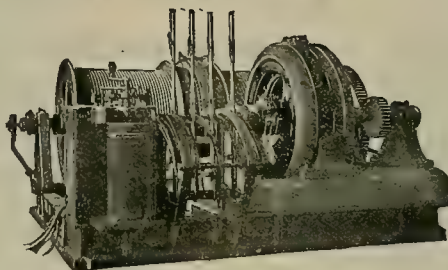
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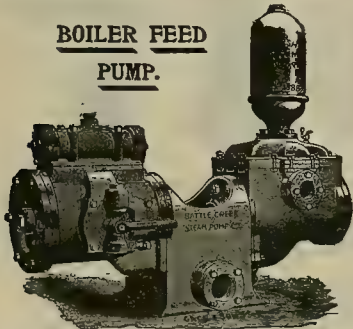
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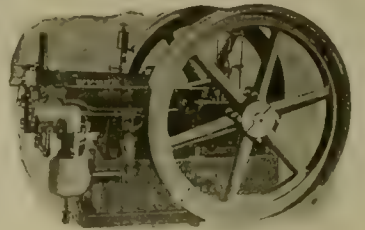
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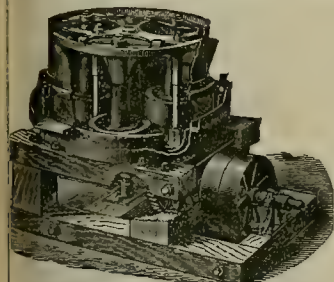
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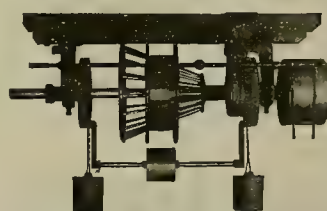
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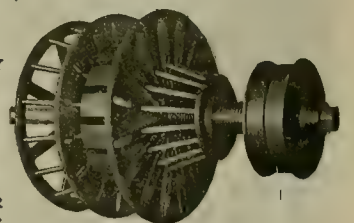


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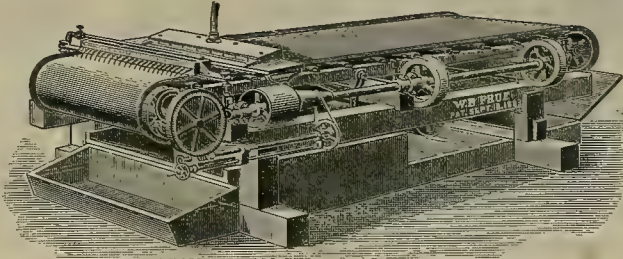
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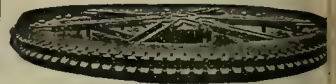
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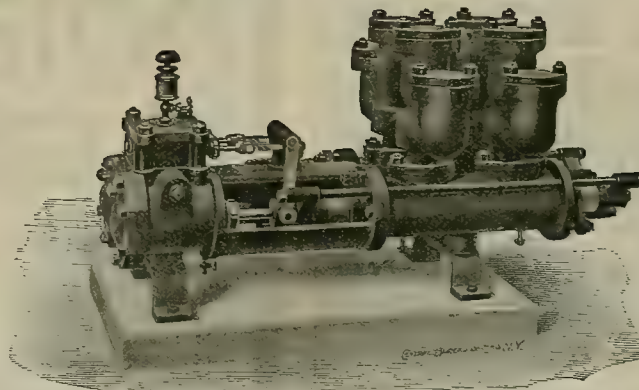
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Cutting & Brown Lease, Tonopah, Nevada.



View of Upper Part of Mizpah Lode and Tonopah, Nevada.

(See Page 192.)

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The pick and shovel have so long been considered the typical symbols of the miner's industry that the knowledge that their primacy is passing brings with it the shock of a questioning surprise. There has been no place with which they have been more associated in thought, and once in fact, than the black galleries of a coal pit. Yet the typical picture of a coal mining gallery to-day is a couple of men armed with monkey wrenches and larger tools that look like loggers' pikes, watching a low-lying, steel-chained thing of metal, that looks like a reaper cutting down coal like grain. Picks and shovels are hardly in sight and very little in use. The same elimination is going on in metal mines. The rock and ore are broken down by powder and then drawn up from the floor and loaded into the mine cars by scrapers. Cars, except platform cars, are self-discharging, and the platform cars are cleaned by a scraper hitched to a cable. Everywhere the pick and shovel are having their former exclusive use limited, till the end when they will have a place in the museum beside the stone hammers and flint knives, is within anticipation.

MANY Colorado and Utah mine owners are discounting the possible unfavorable effect on their business from dependence on the large smelting and milling combinations by making among themselves local combinations in the joint ownership of reduction plants. It is safe to say that such plants cost but little, if any, more to install, ready for operation, per ton of capacity, than the enormous centralized plants of the large combinations. The builders of machinery and reduction plants do not discriminate in prices against the buyers of small plants. The flat cost per ton of capacity for operation may be larger—but is not necessarily so—than the flat cost per ton of capacity for the operation of the custom plants. But mine owners when they pay for reduction of their ores at the large consolidated custom plants do not pay flat cost, but sums which are elastically defined as charges. The profit over flat costs and over current interest on money investment in the plant capacity, as a rule, exceeds the difference in flat costs against the small plants owned and operated by the mine owners. Such small mine owners' plants are at no commercial disadvantage when the combinations hold up prices, as they can sell as they produce in the open market. Being independent, they do not have to reduce production to maintain prices. Natural industrial laws, which would regulate production by suspending the most costly production, when prices go down under decreasing demand or too much production, act freely to restore normal trade condi-

tions. The increasing disposition of mine owners to own and operate their own reduction plants is to be commended. As this journal has frequently stated, custom reduction works and ore buying smelters may make a mine out of a prospect, but they do not necessarily make a mining business out of a mine.

The Lead Ore Market.

The sale price of lead in ores has been reduced by the American Smelting & Refining Co. from \$3.90 to \$3.40 per hundred pounds. This price as a settling basis applies to lead ores bought by the company from producers who do not have contracts with it. These latter will receive payment on the basis of \$3.90 till their contracts run out. The open price of lead to the consumers of the metal remains based on the buying price of \$3.90 per hundred pounds.

It would appear from the present price that lead production is (as this journal suggested some months since) rapidly coming to a point where it must be considered from a mining business standpoint as a by-product production. That is to say, the market price to consumers will be fixed by the production of lead from ores in which the principal values are (first) gold and (second) silver. While the silver production of such ores is much larger than the gold, silver has its own market price troubles. All of the lead produced will not come from these ores, but the largest quantity and cheapest lead will come from them, and the largest quantity and the cheapest cost of production will establish the market price of the entire production.

Combinations may put up the sale price of lead to a very profitable figure, but it is impossible for them to keep the sale price up permanently. There is an average of profit resulting from all metal mining business. If producers of one metal for a time receive much over this average, the effect is to stimulate production by increasing the number of producers. In the production of lead the market price has been high, and to high-grade ore mines has made a large margin of profit possible. Low-grade mines have been exploited under the stimulus of these profits, sharing in them by the production of large quantities of low-grade ore, instead of by lesser quantities of high-grade ore.

The increased production has been abnormal, as a result of the maintenance of the price of lead by a combination of selling interests when the market was not consuming the full production. Left to itself, the price would have receded and cut off surplus production several months since. Now that the inevitable has happened, and the price cannot be maintained any longer, efforts are being made to arbitrarily limit production. Producers who have no contracts are naturally the first to be affected. The price they are offered has been reduced. The producers who have contracts that fix the price are, on the other hand, paid a bonus not to produce. The high-grade ore mines that, under normal business conditions, would be supplying the market are being stood up and forced to pay part of the cost of keeping mines closed that, under the same normal business conditions, would be closed without any payment.

The condition quite fully developed now confirms the correctness of the conclusions this paper has heretofore expressed as to the effect of the smelting combination on the lead mining industry. The mining and reduction of lead in these modern days of close figuring in business can not be conducted successfully as independent business operations. Either the smelting combination must own the mines, as part of the smelting business, or the mines must own and operate reduction plants as part of the mining business. The latter is the commercially desirable condition.

THE idea of crushing with stamp batteries set tandem or in series, one set crushing through a coarse screen and the second crushing the oversize from the first that will not pass the final screen of the second series, is discussed by E. D. Chester in the Mining Journal of London. He states that experimental tests made of the method show an added duty to the stamp head of 35% and a saving of power to the amount of 6%. The test of commercial operation yet remains to be made before the highly satisfactory results obtained in the experimental tests can be used as the basis of the suggested change in

stamp mill practice. The margin for commercial profit is so large, however, that the method should by no means be neglected except as found a failure after most exhaustive trials. In a comparatively small way, but still on a commercial scale, a stamp battery and a Chilian mill have been used tandem in a California plant. The stamp battery crushed through a coarse screen and the pulp went unscreened direct to the Chilian mill, where it was reground. The output was increased something over what the two mills would have done independently, but no record was made of the quantities. It is easy to see that if the pulp from the stamp battery had been screened through the fine mesh screen used with the Chilian mill, and only the oversize run through the latter, there would have been a much larger gain in duty. This method of using a Chilian mill after stamps seems free from some practical difficulties that might be found in commercial practice through using stamp batteries tandem.

Tonopah Mines, Nevada.

Tonopah, Nev., mines are barely a year old, yet they have already made a record notable in a State where notable records for mining districts are almost as numerous as the districts. The complete illustrated descriptive article that appears in this number and the article published in the early-day period of its development six months ago tell the story of the starting of the latest favorite, claiming the attention of the public. Unlike most favorites which take much money from the outside to make them what they are, this favorite is paying its own way from the start. In Tonopah district the yielding of profit has followed so close on promise of it that even the near-by residents of Nevada State do not fully realize it.

Nevada is no longer tied to the fortunes of the Comstock at Virginia City and Gold Hill. As a commonwealth, it is not disappearing through the failure of its original great industry. With the temporary decadence of interest, due to the long-continued period of time since the discovery of a bonanza on the Comstock, the State was unjustly condemned as a field for mining industry. The later years, which to every other State and Territory of the West brought a resumption of mining industry, coincident with the spread of knowledge that mining was business and not gambling, have finally weakened the belief that Nevada mining was a failure and only gambling, and this last year has seen many of the old camps take on a well-deserved new life and has witnessed the discovery of several new ones, of which last so far Tonopah is easily the first.

Most of the older camps which are being reopened have had outside capital providing the means. The new discoveries are the old Nevada prospectors' own. Men who have had the persistence of faith and the coincidence of good luck, and who have remained with Nevada through the years of mining depression, have made the discoveries of Reno and Tonopah and have the rewards. It is pleasant to be able to add that they have shared their good fortune with others whose opportunities and successes had been less.

Tonopah seems to have stood the test of considerable commercial exploitation. The mines have paid their own way. The conditions developed by this considerable exploitation would seem to insure its successful continuance.

THERE is really no "rebellious" ore, in the sense that the early-day miners use the term. It has been the scapegoat for a multitude of mistakes in mines—and in miners. If the ore contained no metal values at all, if it contained silver or copper when, according to the promoters, it ought to have had gold, if the millmen stole it, if it would not amalgamate—it was all fully explained when it was said to be rebellious. The only variation was when it had lead instead of silver; then it was base. Rebellious or base, the art of metallurgy knows the term no longer, as applied to ores. Some have more value than others, some have to be treated by fire, others by water, and lately the wind has been harnessed to treat others. Some of them yield their metal values to the miner, others to the smelting trust; but some one gets the value in any event. Rebellious and base can no longer be used as scapegoats to explain that no one has got the values.

Concentrates.

THE thin coating of lime on the gauge glass can be removed by a little swabbing with strong vinegar.

VERY GOOD samples of bird's-eye porphyry can be obtained from a deposit in Placer county, Cal., near Clipper Gap.

MINE TIMBERS should be framed and secured firmly in place by wedges. Nails or spikes should not be used.

THE Ganz system of electrical railway equipment as applied in Italy is claimed to be at least 40% cheaper than the American systems.

IN an air compressor at 100 pounds gauge pressure 1 cubic foot corresponds to 7.82 cubic feet free air; at 80 pounds pressure, to 6.46 cubic feet; at 60 pounds, 5.10.

ALUMINUM SCRAP has a recognized commercial value, ranging in New York from 24 to 26 cents a pound. This price applies only to the pure aluminum, not to alloys.

A TANK to contain 30 cubic feet of space and 100 balls, each 6 inches in diameter, should contain 36.5 cubic feet. If 37½ inches in diameter it should be 4 feet 9 inches high inside.

THE seacoast lands of Alaska, on Behring sea, have no timber growth at all. The principal source of supply for this article is drift wood, which is piled up on the beaches in enormous quantities.

IF the wolframite carries 60% tungstic acid, and is favorably situated as to mining and freight conditions, it might be commercially profitable. There is a limited demand, chiefly from Eastern steel makers.

THERE are said to be sixty-nine petroleum gushers in eighty acres of land on Spindletop hill, at Beaumont, Texas. It is reported that the pressure is diminishing and that the installation of pumping plants is anticipated.

OUTSIDE of California, the only producing quicksilver properties north of Mexico known to "Concentrators" are at Woodstock and near Jacksonville, in Oregon; Savonas, British Columbia, and Terlingua, Texas. Each of these has been illustrated and described herein.

FOR tunnel and drift timbering, round or split timbers will generally be found most economical. In shaft work, sawn timber will generally be found to cost less than round timbers. The latter require much more work to frame and are not so adaptable to machinery installation.

THE best up-to-date information on ore concentration can be had in this paper or from the latest catalogues of manufacturers of concentrating machinery. There is not any "new book" on that subject, as manufacturers and metallurgists are in this case in advance of the book-makers.

THERE is no platinum ore "in place" in California or on the Pacific coast, so far as known, the metal on this part of the continent being found usually in grains or pure metal, or as grains of a metallic alloy containing platinum. It is rarely found other than where placer gold is found.

COPPER WIRE for the feeder wires of electric railway lines is being more and more replaced by aluminum wire. It is claimed that, at the present price of copper, aluminum is 20% to 25% the cheaper. It is estimated that over 600 tons of aluminum were used for electric feed wires in 1900.

THE excellent quality of Norway iron was due to the smelting of the ore with charcoal at a low temperature, which did not reduce the silicon and phosphorus in the ore. The latter impurity is present in less quantity in Norway iron ores than in the iron ores of other iron manufacturing countries.

THE International Mining Congress may not be held in Butte, Mont., in 1902. It is required that Butte raise about \$10,000 to entertain the delegates, and failure to do this would be the reason for sending it to Los Angeles, Cal., which was the second choice of the late meeting of the Congress at Boise, Idaho.

THE U. S. District Court of Alaska, in the case of Price vs. Broakway, a suit of ejectment over the possession of a town lot of Skaguay, has decided that a suit of ejectment can be maintained for the possession of improvements on Government land in Alaska. The lot in dispute was not fenced or otherwise enclosed, but had a cabin on it.

THE Supreme Court of Montana, in the case of Parrott Silver & Copper Co. vs. Heinze, decided that, where the apex of a vein passed through a side line and through an end line of the claim, the extralateral rights were bounded by the plane of the end line and by a parallel plane extending downward through the point where the side line was crossed.

THE fractions or fractional claims described in accounts of Alaska mines consist of the small pieces of ground that are left over when claims are measured out closely. The custom of the miners in locating is to include too much ground rather than too little. When restricted to legal limits, the excess becomes a fraction or fractional claim. They are closely looked after in rich ground.

THE machine weighing less than two pounds, to drive shingle nails, does not require technical skill to operate; a workman with less labor and no physical discomfort

is enabled to do shingling at a doubled speed as compared with the hand method. The machine is fed several handfuls of nails of the size for which it is made, and it then sets them up and drives them one at a time—two blows of the plunger hammer for each nail.

ORDINARY CONCRETE, even in masses of great thickness and when made with mortar rich in cement, is always permeable to water. Only a tight, smooth and continuous lining is able to protect it. This can be made of tarred felt in two or preferably three layers. It is built into the breast of the concrete mass so that it forms a sort of partition in it. Water which may reach it through cracks in the cement cannot pass through it.

THE preferable type of ladder construction in a vertical shaft is broken into short stages by platforms in the ladder compartment. The ladder line is thus made up of a number of short ladders set inclined from platform to platform. The length of each ladder is from 16 to 21 feet, advantage being taken of 5-foot apart timber sets for the platforms. The breaking of the ladders into sections is an advantage in sinking a shaft and is safer for men who use it at any time.

THERE is no limitation by law of the number of claims, either lode or placer, which one person, properly qualified according to law, can locate on one placer deposit or on one ledge. A discovery location on a ledge can be made and then extensions can be located. It is essential, however, to make the location of the latter valid, that there shall be discoveries on them—that is to say, they cannot be located on faith alone as extensions, but must have on them valuable mineral which is discovered by the locator.

THE Tipton district mines, England, made an output of mineral during the year 1900 of 707,602 tons. The total quantity of water raised was 18,385,780 tons, or twenty-six tons of water to every ton of mineral. The cost of the pumping per ton of water was about a farthing (half a cent). The pumping plants are regarded as obsolete and expensive and changes are projected looking to the installation of electrically operated pumps, with power obtained from gas made by the Mond method for the prime mover.

THE Supreme Court of California, in the case of Cave vs. Tyler et al., on appeal from a San Bernardino county trial court, has decided that an appropriation of water from a stream, diverting the entire flow, does not ripen by prescription into a vested title as against a subsequent diversion by a riparian or other claimant up stream; that there is, by virtue of the lower and senior appropriation taking all the water of the stream, no vested or accrued right to all the water of the stream up through the public land to its source.

THERE is no good business reason for the practice of allowing very large margins of power in providing for the machinery of a mining plant. Extra weight and cost of the excess of metal, and extra operative cost to move the excess, make a continual unnecessary burden of cost against the business. Machinery should be given enough power to do the work for which it is designed, but it should be kept in such a condition of efficiency that there should be no necessity of having an excess of power for contingencies. There should be no contingencies.

THE Commissioner of the General Land Office at Washington has adopted a new schedule of deposits for official surveys of mining claims in the office of the U. S. Surveyor-General for Utah. The deposits will be: For lode claim, \$30; for placer claim, \$30; for mill site (separate), \$25; for mill site and lode claim embraced in one survey, \$45; for upward of three locations embraced in one survey, for the first location, \$30; for each subsequent location, \$20; for each lode claim within and included in the survey of a placer claim, \$15; for certificate of \$500 expenditure of improvements after approval of survey, \$5.

A NARROW vein of high-grade ore is ordinarily most economically and satisfactorily worked by stripping the vein on the hanging wall side before breaking it down. The object of this is to enable a more thorough separation of waste rock and ore to be made. With the hanging wall rock broken out and disposed of as filling in the stope underfoot, a canvas or board floor can be laid on it, onto which the ore falls when broken out. From this it can be sacked directly or shoveled into chutes without the loss of the finer broken ore, which is as a rule the richest. Any waste broken out from the foot wall with the ore is readily sorted out and thrown aside.

LOCATIONS of mining claims within patented town sites have been declared void by the California State courts. The case on which the decision was made originated in an attempt to locate placer ground in the town site patent of the city of Oroville in Butte county. The status of lands outside the survey meander lines of Feather river at Oroville and in the bed of Feather river are now being litigated by mineral claimants. In a case before the Interior Department at Washington, where the same question was at issue with Rogue river, Oregon, placer claims, the Department ruled that it did not have jurisdiction, and that locators on such lands would have to get title and the right of location under State laws.

THE gold in sea water does not precipitate from its solution in sea water during the Arctic winter, when the water under the ice is quiet. The gold-bearing beaches at Nome, Alaska, are not enriched by gold from that source. The proponent of the theory must have confused solution with suspension. Fine particles of gold

mechanically suspended in sea water or any other kind of water will settle out of it by gravity. But the gold in sea water is not suspended as such, but is in solution, probably as the chloride and bromide of gold. These salts have to be chemically broken up to precipitate the gold. There is no evidence that these salts which are in exceedingly minute quantities in sea water are broken up and deposited while part of the sea water. This paper has several times heretofore, in answer to inquiries, explained in detail the simple, natural action by which the land-formed placer deposits became the bed of the sea and the marginal beaches to it.

GOOD ROADS, or their temporary substitute—good trails—cannot fail to prove an economy in the opening or prospecting of a mine. The custom of using the barest excuse for either for months, or it may be years, until the prospect develops into a mine results in an entirely unnecessary loss of time and labor used in travel over them. This loss is really a loss of money, because time and labor necessary or unnecessary have their money equivalents. It is cheaper, too, to make the good road or the good trail in the beginning, once for all, and not make a series of successively closer approximations to what is desirable, each in turn to be abandoned for the succeeding better one. Several poor substitutes for roads or trails will invariably in the end be found to have cost more than the one good one made in the beginning. The excuse that the prospect may not make a mine, and roads or trails will then become a dead loss, is not a sufficient one, though true. The development of the prospect is begun on just exactly as if it was the beginning of the making of a mine. Every economy that would prove such in the long run of mine operation is economically justifiable from the beginning. Besides, it may be added that, suppose along with the other money, time and labor put in the ground, the money, time and labor put in the road or trail is lost, there would on close accounting be found, as a rule, less money, time and labor loss in the good road or trail construction than in the poor substitute.

THE custom in Russian and Siberian mines is for the miner to make on the employer's time the handles to the picks and shovels. The pick commonly used is made of iron, steel pointed, weighs about six pounds and consists of a handle socket and only one point. The handle which the miner prepares is the limb of a small tree trimmed down with the ax. It is only about 24 inches long, and is thus shorter than the handle of the American pick. The shovel is about the size and weight of an American coal handler's shovel. In shape it is more dish like, more pointed and longer in proportion to width than the long-handled mining shovel of the West. The handle, like that for the pick, is made by the miner from the limb of a tree which has been worked down into shape with an ax. The handle is short and is fitted into a metal socket and held by a pin. The miner cannot lift earth and rock with it over breast high, and that with very considerable effort, as compared with a throw of 8 to 9 feet made by the American miner's shovel. The Russian operators, however, very generally will be found to prefer their own home-made tools, claiming them to be the cheaper for them, particularly because the native tree-limb handles are so cheap and can so easily be replaced when broken. It is largely through such ideas of cheapness and the use of such inferior tools that the Russian mining is costly, though Russian miners' day wages are very low. It is a condition that has not always been given the determining weight in considering the mining investment of foreign capital in Siberian mines that it should have. When the better tools are substituted and the workmen made skilled in their use, the latter invariably have to be paid higher wages, so that in the end it is found that the cost of the work to the mine operator is not diminished a great deal.

THE longest mining tunnels projected and in course of actual construction are very largely in Colorado. These they are being run to crosscut single mountains and ranges containing a large number of ore-bearing ledges. These ledges are being intersected at depths far below what would be economically profitable by shaft mining. In addition to the great depth of backs over the floor level that these tunnels open, they can, when these upper ore bodies are more or less worked out, be utilized as a surface from which to sink to depths beneath. The tunnels and the open workings above offer exceptional advantages for this sort of deep mining. By provision therefor, the water that flows into the overhead workings can be collected there and conducted down to the tunnel level in pipes under pressure, which can there be utilized for power development. Practically, this costs the minimum in the way of investment, and, being possible of use direct, can provide the maximum of effective work from the theoretical efficiency. It is safe to say that 70% of the theoretical water power can be had in work. Under average conditions, more water will enter each 100-foot depth of workings above the tunnel levels than below. The power, then, that can be developed from the inflowing water above will perform the service of lifting of the lesser quantity of water coming in workings below to a depth very nearly, if not entirely, equal to the feet of head of the power water. With these practical working conditions, the tunnel exploitation of lode deposits in Colorado means cheap deep mining to depths that are unthinkable with dependence solely on shafts from the surface. The deep mining so effected may not be as spectacular as the deep shaft mining projected in the Transvaal, but it has the more satisfying quality of a safer and larger profit margin.

Tonopah.*

[STAFF CORRESPONDENCE.]

Once in a while the rapid wealth producing power of a new mining discovery gives to its place a name that remains fixed and inseparably associated with it, despite the far-reaching influence and efforts of the United States Postoffice Department to name it something else. The Comstock is such a discovery and such a name. Officially, to the Postoffice Department it is Virginia City and Gold Hill, but these might pass and yet "The Comstock" remain an undying memory of fortune from mines. Tonopah, like the Comstock, also in Nevada State, shows indications of becoming possessed, like it, of a name of destiny. Called Tonopah first by the discoverer of the mines, the Postoffice Department named it by request Butler to commemorate the name of the discoverer. But Tonopah it remains in speech and writing, and seems likely to remain.

Tonopah is that dream of the prospector—a grass-root mine. At least, it would be a grass-root mine but for the complete absence of the grass. It is well in toward the heart of Nevada, and well towards its top, being 6300 feet in elevation. This journal in its issue of May 18 gave an account of the discovery of the mines and their development at that time. Referring to it, the first settlement and work started just a year ago. By January 1 of this year the population was 80; by May 1, 225. Now it is easily 1000, and easily the leading mining town of Nevada in output of gold and silver and in mining activity. In a short year a community has grown up in the heart of a Nevada desert from just nothing at all to become a young city, building and supporting itself, not out of the surplus wealth of older communities, but by itself, by its own labor and the output of its mines.

This last is the striking feature of its growth and the all but indisputable guarantee that the district, as a center of population and profitable, self-supporting mining industry, is an enduring fact and not a Nevada desert mirage.

James L. Butler, the discoverer, brought no money into the desert to make a mine. He paid for his first assays by a deed to a twelfth interest in what he had

the royalty from the leases is repaying it faster than it was paid out.

As Tonopah is at the present time, it is an important place, 60 miles from and southeast of Sodaville, a station on the Carson & Colorado Railroad.

This station is the railroad base for supplies and also the shipping point for the ores which have been

at which point passengers are compelled to remain over night, the service from that point southward being tri-weekly, leaving Monday, Wednesday and Friday, passengers lying over night at Hawthorne and connecting with stages at Sodaville the following morning for Tonopah.

There are ten restaurants in Tonopah, and several



Brower Bros., Golden & Sinclair Lease, Tonopah, Nevada.

sent for treatment to the Selby Lead & Refining Co. at San Francisco.

The road between Tonopah and Sodaville is a natural, unimproved highway of very easy grade, following the depressions between the hills and crossing the sagebrush plains which make the characteristic topography of the State.

A tri-weekly stage runs between Sodaville and

lodging houses, and two hotels are now being erected. Board is \$8 a week or 50 cents a single meal. Wood is \$15 a cord and hauled 15 miles. Water will soon be piped to town; it is now hauled in barrels and sells at \$1.50 a barrel. Lumber sells at \$55 to \$65 a thousand, being hauled 60 miles from Sodaville. Hay in small lots brings \$2.50 per hundred and \$35 per ton. A large amount of produce comes here from



Oddie, Pheby Bros. and Peters Lease; Golden, Beauchamp, Tamblin & Sunderland Shafts in Background, Tonopah, Nevada.

found. The men who took first leases from him brought no money with them to pay for the mining. They were working miners, with no capital but the miner's knowledge of what was a good mine and the miner's strength and skill of arm to convert it into money. The men who did bring money to buy the mines have merely had to lend it—not spend it—for

*See illustrations on front page.

Tonopah, the journey requiring a day and a half, stopping over night at Crow Springs, a stage station, affording good accommodations. Railroad fare from Reno, on the overland railroad, to Sodaville is \$11, and from there by stage the round trip is \$12, or \$7 one way. The freight rate from Sodaville to Tonopah is \$20 per ton. Trains leaving Reno in the morning connect with the Carson & Colorado Railroad at Mound House daily for Hawthorne,

Bishops, Inyo county, Cal., by wagon transportation. Miners' wages are \$4 per day, carpenters' \$4 to \$6. At present the camp is supplied with miners, and the market for other labor is pretty well supplied.

There are three groups of mines in this camp, owned by three independent companies. The Butler group, comprising the original discovery locations, is owned by the Tonopah Mining Co. of Nevada, with J. H. Jenkins as general manager. The

Gold Hill group is owned by T. L. Oddie, Brougner Bros., A. L. Hudgens, R. Gordon and P. Manning, all residents of Tonopah. The Clifford group is owned by W. H. Dickson, A. C. Ellis Jr., O'Meara Bros., J. B. Thompson, J. E. Bamberger, W. A. Wilson, T. J. Lynch and others of Salt Lake City, Utah.

The Butler group embraces eight locations, the ledges all running nearly parallel, the Mizpah being at the northern and the Valley View at the southern boundary of the combination. The distance between these two is about 1500 feet. The topography and the situation of the several ledges are such that shaft

avoided breaking down second class ore or waste rock with it, and have made no special effort to produce quantity, but directed all energy toward getting selected, high-grade ore, which has also tended to limit the output.

The Mizpah ledge, at first neglected, is now producing much more ore than the aggregate of all the other ledges of the camp, and at present is being developed on a more extended scale. The developments on this ledge prove it to be a continuous ore shoot of 1300 feet, averaging about 4 feet in width. At no point along this ledge does it produce other than high-grade milling ore. Nearly 50% of the ledge, so far as exposed, is composed of ore containing values in gold and silver of \$100 to \$300 per ton.

Along the course of this ledge, and within the 1300 feet above named, ten shafts have been sunk, averaging between 100 to 175 feet in depth, from which drifts have been run for considerable distances. To a depth of 150 feet this ledge has been pretty well blocked out and its value is closely estimatable.

Beginning at the west end of the Mizpah ledge is lease No. 44 of Lynch, O'Meara & Sullivan, one of the greatest producers of the camp. The owners have lately installed a gasoline engine and hoist and a rock breaker, and will soon have in operation air compressor drills.

The next lease is No. 30 of Wilkinson, Coslett, Robinson & Stott, which also is yielding heavily in both high-grade and milling ore.

Cutting & Brown own the next lease, No. 19, which to-day, at a depth of 165 feet, has a 7-foot ledge of ore that will average \$150 per ton. This lease is also one of the largest producers in the camp of shipping ore.

The Clark or Company shaft, which joins lease No. 19 on the east, is down 155 feet, with a 4-foot ledge in the bottom. While sinking the last 75 feet, this shaft has in places produced over \$500 a foot.

Brougner Bros., owners of lease No. 36, also one of the very best producers of high-grade ore, are unable to sack it as fast as taken out. There are now 2000 sacks of shipping ore awaiting wagons to haul it to the railroad.

The next lease, No. 50, is that of Sinclair & Golden, who, after going through 100 feet of capping, struck a shoot 35 feet long of ore that assays \$200 to \$300. They now, at 160 feet, have a 4-foot ledge of high-grade shipping ore.

Lease No. 34 is owned by Oddie, Pheby & Peters, who have a shaft down 130 feet. They have had considerable shipping ore and a large quantity of milling ore at 115 feet down. Drifts 40 and 80 feet show 5 to 7 feet of milling ore.

Lease No. 80 is owned by Frank Golden, who, after going through ore of little value for 120 feet, struck good ore that has increased in value, and at present has a 4-foot ledge at 155 feet depth that carries values of \$200 to \$600 per ton. The recent exposure of this body of ore which is 250 feet farther east from others of high grade proves more fully the extension of the ore shoot.

Still farther east, and higher up the mountain, is lease No. 52, of Golden, Beauchamp, Tamblin & Co., who are taking out a large amount of good ore after sinking through heavy capping.

The next higher lease is that of Spenker & Co., whose claim has already produced some good ore. They are sinking and expect to strike the rich ore shoot.

Every one of the above leasers has been taking out ore at a profit and the total product will average over \$5000 per day. Cutting & Brown of lease No. 19 within a few days took out eight tons of ore that averaged \$500 per ton.

The Gold Hill group adjoins the Butler group on the south and consists of three claims—the McCulloch, Good Enough and Butler. While the general characteristics are similar to the Butler group, the overlying formation is hard; but, as depth is attained, the formation becomes softer, the ledges larger and better.

The ledges show excellent walls, with talc gouge, and are nearly perpendicular, inclining a little to the north, and about parallel to the Valley View ledge. While there are plainly a number of ledges in these claims cropping out on the surface, others are determined only by sinking.

There are a dozen prospect shafts, most of them being sunk by lessees, the deepest being 80 feet. The owners are about to put up a whim and sink a shaft to considerable depth. This group has been producing small quantities of high-grade ore for several months, and, as depth is attained, the indications are good that their values will prove as good as the Butler group.

In connection with the Tonopah properties, an enterprise known as the G. & H. tunnel site has been started. This tunnel crosses into the mineral zone and is headed towards the Butler group. It has now



Cutting & Brown Lease, Tonopah, Nev.

work is the only means of operating them to any depth, or, in fact, of performing any development work of consequence. All of the ledges are being operated by leases under a royalty of 25%, and upon allotment of territory 100 feet in length by 50 feet in width along the veins.

Operations are by no means strictly confined to the major lodes, for intervening—and, in fact, running almost parallel—between the stronger ledges are auxiliary ledges, all ore-bearing, that are also being prospected and developed.

In this area of about 1500 feet square shafts and cuts are in operation everywhere. Sacks of high-grade ore are piled up on the various dumps like



East End Valley View Ledge, Open Cut, Tonopah, Nev.

grain or cordwood. Over 10,000 sacks of ore, averaging over \$10 per sack, are on the Mizpah ledge alone, awaiting transportation. Windlasses, whips and whips meet the eye in every direction. Nearly all of the ore taken from the properties has been the result of development openings in sinking the shafts and by underhand stoping. Had the ground been opened and overhand stoping been systematically done, the product would have been much greater up to the present time. The leasers, aiming to extract the richer ores, have as far as possible



Cutting & Brown Lease, 50-Foot Level, Tonopah, Nev.

entered Oddie mountain, a distance of nearly 300 feet, and a connection has been made with the surface for air.

The face is now in a highly mineralized formation, and it is expected by the owners that any blast may break into ore. The owners of this property are T. L. Oddie, Brougner Bros., A. L. Hudgens, Robert Gordon and P. Manning—residents of Tonopah.

The Clifford group consists of the Wandering Boy and Stone Cabin claims; the former lies at the west end and the latter at the east end of the Valley View lode.

These, together with the Lucky Jim, were purchased by Dickson & Ellis of Salt Lake City last August. Up to the present time these claims have been exploited with a large force of men. The ores are very similar to the ores found on the Butler group; the ledges are strong and well defined. The company will soon equip the property with hoisting machinery.



Edwards, Cutting & Co. Lease, Tonopah, Nev.

The future of the Tonopah is not solely dependent upon the very rich rock that is being extracted, but, if anything, more upon the great mass of ore that will not pay the present heavy expense of transportation and reduction. Under existing circumstances it would be a difficult matter to form any satisfactory estimate of the amount of such ore in sight, inasmuch as a large percentage of values already mined is the result of shaft work, unconnected openings and drifting, carried on only to a very limited extent.

In this district a black silver sulphuret is the pre-

dominating mineral; gold here follows the silver in the ratio of \$25 of the former to 600 ounces of the latter, and, while treatment by free-milling process would save most of the metal, the owners' opinions differ regarding the advisability of undertaking to extract all of the values in the Tonopah ores by this process. Thus far, if there is any perceptible change, it is that values are increasing, rather than diminishing, as work progresses, and in some of the exposures the ratio between gold and silver is in favor of the gold in opposition with the general relative output of the two metals.

The idea formerly obtained here that the high-grade ores occurred in "pockets," but it is generally conceded now that the rich ores occur in shoots in the ledges of milling-grade ore. This has been proven particularly in the Mizpah ledge. Leases that had no shipping ore on the surface have been able to cut the high-grade shoots of their neighbors by studying the trend and sinking to proper depth.

A very interesting feature of all the ledges of the group, and particularly of the Mizpah, is the numerous lateral faults that occur at frequent intervals. While these have in some places thrown the ledge as much as 10 feet, they have not to any extent inconvenienced mining. In the opinion of some, these faults are to a considerable extent responsible for the extreme richness of the so-called shoots. It is suggested that the ledges were first formed of a milling grade of ore, and, by the subsequent faulting, the solutions that originally deposited values had a second opportunity to enrich the ledges at the points of fracture, and thus there seems to be an established system of shoots following along these lines of faulting.

The Tonopah or Butler group of mines up to the present time has produced over \$400,000. Besides this amount, 500 tons of ore are now en route to the smelter for reduction, and this ore is as good as that which has already been treated. Also, there are 15,000 sacks of same grade shipping ore now on the claims awaiting transportation to the railroad. Finally, there are 10,000 tons of second class ore now on the dumps waiting the determination of the company as to the most efficient and profitable process of reduction to be installed.

Nine-tenths of this ore has been taken from the Mizpah lode, as the largest development has been done on this lode. The Valley View lode, 1500 feet east, and several other lodes lying between it and the Mizpah, have produced proportionately well for the amount of development work done on them.

The Tonopah Company has already begun work with a view of getting a good supply of water into the camp from two different sources, and probably within sixty days the system will be ready for operation. There are over 400 animals engaged in hauling ore from this camp to the railroad, and as many more could be profitably employed.

There are 125 wooden buildings and 200 board and canvas buildings here, and more going up daily. There are fully 1000 residents here to-day. The community is one of the most orderly on the coast; nearly every branch of business is represented, including a branch of the Bullion Exchange, Bank of Carson City and a free library. Funds have been raised for a school building and steps taken to erect Presbyterian and Catholic church buildings. There is a good weekly newspaper, the Tonopah Bonanza, published here.

For the photographs from which the half-tones illustrating this description were made this journal is indebted to the courtesy of Al Smith, photographer at Tonopah.

Tonopah, Nevada, Nov. 1.

NOTHING better illustrates the dependence of one branch of science upon another than the history of the U. S. Weather Bureau. Meteorology as a science is almost absolutely dependent upon the electric telegraph; indeed, it is as it stands to-day directly a product of the extension of telegraph lines over wide areas. When the telegraph was invented and first put to work, no one foresaw that one of the results which would follow this extension would be the ability to plot instantaneous charts showing weather conditions over such a wide area as that of the United States, for example. As soon as it was possible to do this, it became easy to study the motions of storm centers and weather areas, and from them the science of meteorology, especially of weather forecasting, has arisen. While some of us may feel occasionally that this is not an exact science, yet statistics show that it is far more exact than is commonly believed, and that the percentage of verified weather predictions is astonishingly large. Both the weather service and the time service of this country are entirely dependent upon the telegraph.—Electrical Review.

THE following are the figures for the output of platinum from the Urals, Russia, for the last ten years: Ounces troy—1891, 135,874; 1892, 146,394; 1893, 165,787; 1894, 167,743; 1895, 141,668; 1896, 158,520; 1897, 181,693; 1898, 192,225; 1899, 191,172; 1900, 174,846. At present the Urals yield 96% of the world's platinum supply. The Platinum Industrial Co., which bought up a group of the most productive platinum mines, counting on an annual yield of 67,000 ounces, only produced 26,000 ounces.

Late Gold Dredging Practice.*

NUMBER II.

Written for the MINING AND SCIENTIFIC PRESS
by RALPH L. MONTAGU.

VARIOUS TYPES OF DREDGERS.—The following description applies to the type of dredger developed at Bannack, Mont.:

Fig. 1 illustrates the principle on which the dredger works. The gravel is excavated by an endless chain of alternate buckets and links and

the grizzly extends aft and is carried on and supported by an auxiliary flat boat. The flexible connection in this case is arranged by having the lower end of the sluice box on the dredger overlap the upper end of the sluice on the auxiliary flat boat. An opening is made in the bottom of the upper box, where it overlaps the lower box, which allows the material to pass through, and a turntable supporting the lower box at this point produces a flexible connection. The pump lifts water only, and consequently does not wear out as soon as the pump in the first mentioned dredger, which lifts water and gravel.

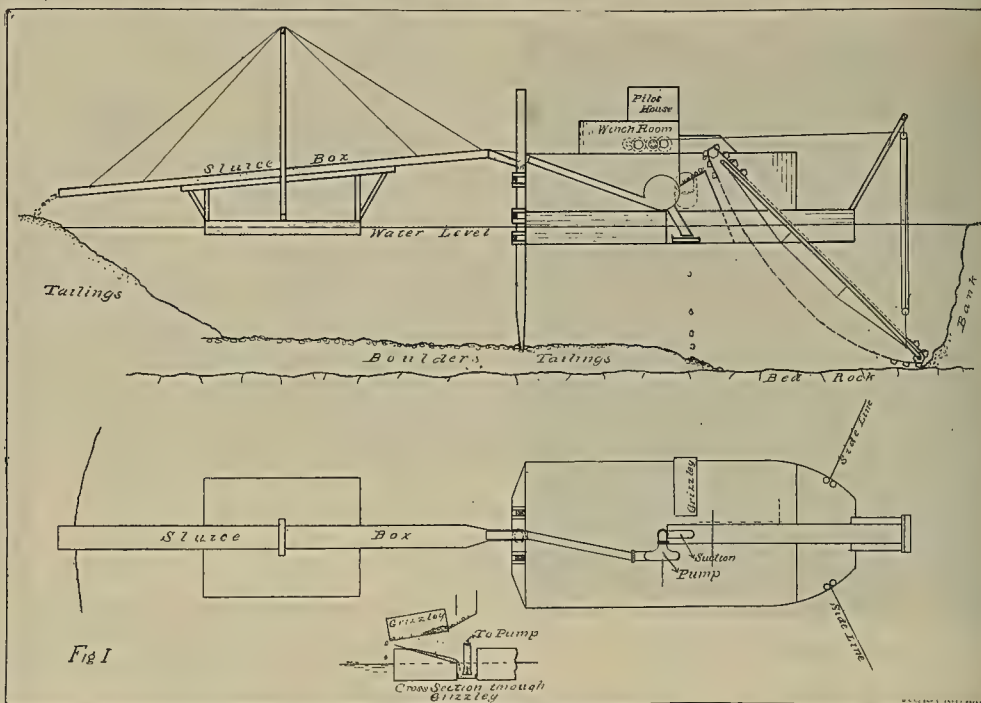


Fig. 1.—Principle Upon Which Dredger Works.

dumped into a rotating grizzly. A perforated pipe carrying water extends through the grizzly and by this means a number of jets of water impinge on the gravel and thoroughly wash the smaller particles free from the larger. The large stones fall overboard, the finer material carrying the gold falling into a sump, whence the gravel and water are lifted by a centrifugal pump into the sluice box. The fine tailings are deposited in the cut made by the dredger.

The upper end of the sluice box rests on a turntable, the base of which sets on the dredger, and a short length of special hose is the means of connecting the discharge pipe from the pump to the upper end of the sluice box. This arrangement forms a flexible connection between the dredger and the sluice box boat, and by means of cables anchored on shore and passing through pulleys on the sluice box to a hand winch on board the dredger the end of the sluice box can be swung from side to side of the cut and the tailings can be evenly distributed.

The dredger being held in position by a spud at the stern, the digging is done by commencing at one side of the cut and swinging slowly across to the other side by pulling in on one side line and at the same time releasing the other. The ladder is then lowered and the dredger is swung slowly back. This is continued until bedrock is reached. The ladder is then hoisted and the dredger moved ahead by swinging the boat and using the other spud to step up with in the following manner: We will presume the right hand spud is down. The dredger is swung to the right hand side of the cut; the left hand spud is dropped; the right hand spud is hoisted; the dredger is then swung to the left hand side of the cut and the right hand spud is dropped; the left hand spud is hoisted and kept up until another move ahead is necessary.

The distance moved ahead is regulated by the length of the arc through which the dredger is swung. While the dredger is moving ahead it is not digging. The operator stands in a pilot house, from which he has a full view of the work. By a system of levers he controls the bucket chain and the winch that hoists the ladder and swings the boat, and in some cases the same winch hoists the spuds.

This type of dredger makes a very clean cut—i. e., does not leave any gravel behind it. It can successfully handle very coarse gravel and large boulders. The spud holds it steady and there is not so much surging backward and forward of the dredger as there is on dredgers that do not use spuds. A dredger of this type with 5 cubic foot buckets will average about 2300 cubic yards per day from the beginning to the end of the season.

Another modification of the same model is the "single lift" type. In this style dredger the upper end of the ladder is considerably higher than in the preceding type. The grizzly is placed fore and aft and the sluice box beginning directly under

A stone chute carries the large stones overboard; the other points are similar on both dredgers.

(TO BE CONTINUED.)

Cyanide Treatment of Coarse-Crushed Gold Ore.

TO THE EDITOR:—A number of articles have been published lately in various mining papers regarding a so-called new discovery in the application of the cyanide process to gold-bearing ores, and as the case has never been quite correctly stated I thought it might be of interest to your readers to know the facts in the case, as there are probably numerous cases where the same system can be employed to a great advantage.

The mine where this work has been done was formerly known as the Cummings mine, near Callahans, in Siskiyou county. It has been opened and operated for a great many years, but owing to the extremely fine character of the gold the values in the ore could not be recovered by milling and amalgamation. Numerous assays of the ore showed an average value of from \$6 to \$9, and mill tests on the same samples showed that but from 13% to 17% of the assay value could be saved by amalgamation. Numerous tests were made with cyanide solution, and it was found that by passing the ore through a 40-mesh screen and treating with a weak solution of cyanide for fifty-six hours 96% of the assay value of the ore was recovered without the use of lime.

As the ore body showed every evidence of permanency, a dry-crushing cyanide plant was recommended and installed by the Helena Gold Mining Co., the present owners of the property. A new mill was put in to do the crushing, and after several months of trial it was discarded, as it was impossible to prevent the mill from grinding the ore to an absolute powder and making so many slimes that leaching was impossible.

Further experiments with the ore showed that the values were contained in an oxidized iron pyrite, and that the ore in breaking in the mine, as well as in the breaker, always broke where the structure of the ore had been weakened by the intrusion of a pyrite. It was then decided to experiment with coarse material, and these experiments were made under the direction of Frederick Lundstrom, who was in charge of the cyanide plant, and James McKeen, the superintendent of the mine. The results of the first tests showed that 80% of the value of the ore could be extracted from the material directly from the rock breaker—or, in other words, all material that passed through a grizzly with bars set 1 inch apart on an incline of 45°. This material was in no case larger than 1-inch pieces. The greater part of the material, however, was broken to about ½ inch or finer, and the consumption of cyanide in the treatment was one-half pound per ton of ore, the time of treatment being from seventy-two to ninety hours.

There is nothing in particular to wonder at in this

method of treatment, and its success lies in the fact that the values were contained in the oxidized iron pyrite, which was invariably exposed to the surface by the natural breaking of the ore. It is probable that the ore will change in depth to a sulphide, and in that event, of course, finer crushing will be necessary, but I am of the opinion that in all cases where it is found that the values are contained in oxidized pyrite this coarse crushing and cyanide treatment will be applicable.

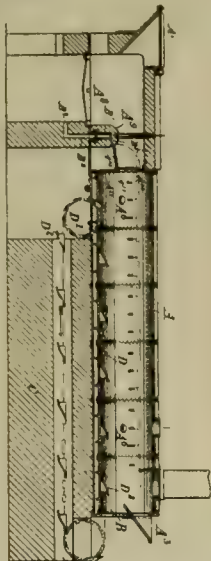
EDWARD H. BENJAMIN.
San Francisco, Cal., Oct. 29.

Mining and Metallurgical Patents.

Patents Issued October 29, 1901.

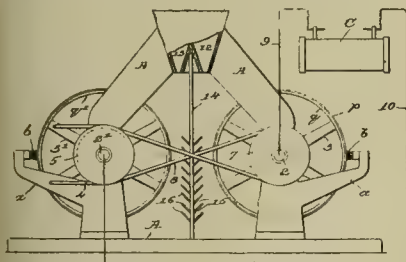
Specially Prepared for the MINING AND SCIENTIFIC PRESS.

ROASTING FURNACE.—No. 685,344; E. B. Parnell, Carshalton, England.



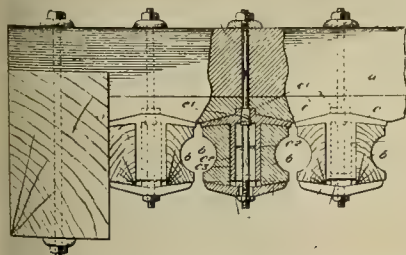
A longitudinal housing A, of triangular transverse section rounded at top or apex, a hearth B dividing the housing throughout its length into upper and lower chambers A₂ A' respectively, means of communication between one end of each flue and a common source of heat and a chain conveyor arranged along length of hearth.

METHOD OF SEPARATING VALUABLE METALS FROM METAL-BEARING MATERIAL.—No. 685,508; C. E. Dolbear, Hyde Park, Mass.



Separating gold or other metal particles from the siliceous or similar particles in mill pulp, or other metalliferous material, consisting in passing the metalliferous material between and within the influence of opposing electrodes, charged with electricity of opposite kinds, whereby all particles of metalliferous material are attracted toward electrodes, and after contact therewith metal particles are repelled from electrode with which they have made contact, and attracted toward opposite electrode, while siliceous or similar material remains under attracting influence of electrode, and stopping passage of repelled particles during their passage from repellent electrode to attracting electrode.

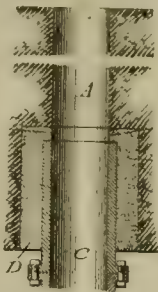
GUIDE FOR STAMP MILLS.—No. 685,622; E. Major, Denver, Colo.



The girth beam, a back clamping plate dished rearwardly and having rearwardly projecting bosses, the girth beam being constructed to correspond with the face of plate, back clamping plate being provided with two forwardly extending flanges connected by a web at front edges, a front clamping plate dished forwardly and provided near top and bottom with rearwardly extending lugs adapted to

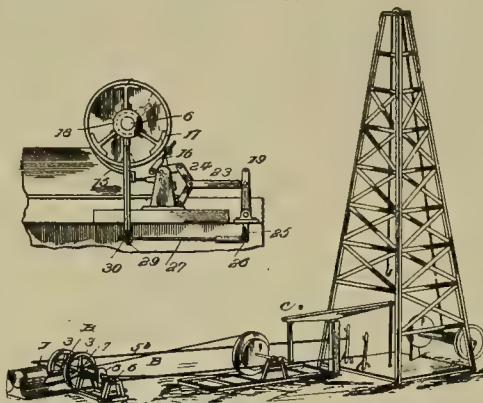
enter space between flanges of back plate, guide blocks held between clamping plates and engaging flanges, and bolts extending through clamping plates and girth beam, bolts passing between flanges of rear plate and having tapering enlargements intermediate of ends adapted to engage tapered openings extending through bosses of back plate, ends of bolts being secured to girth beam and front clamping plate.

PACKING FOR DRIFT, GALLERY OR OTHER OPENINGS IN MINES.—No. 685,522; J. Muirhead, Pittston, Pa.



A mine opening having an enlarged chamber below same, a column in chamber, and packing material in unoccupied portion of chamber around pipe, column extending downwardly from chamber to a pumping device with which it is connected.

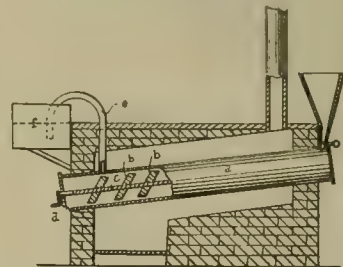
APPARATUS FOR DRILLING AND OPERATING WELLS.—No. 685,641; J. Reid, Oil City, Pa.



A well drilling and operating apparatus, a continuously running explosive engine having a main drive shaft, a power-transmitting shaft in alignment with main drive shaft, a coupling detachably securing transmitting shaft directly to main shaft end to end and stopping, starting and reversing clutch on transmitting shaft and suitable means to operate clutch extending forward to derrick floor; clutch and operating means consisting of a transmitting pulley or drum loose upon shaft, a reversing gear on shaft thrown into or out of driving relation with pulley or drum, a wheel concentric with shaft and a brake band applied to wheel, a brake band lever for applying brake, a friction clutch forced by a movement longitudinally to shaft into and out of driving

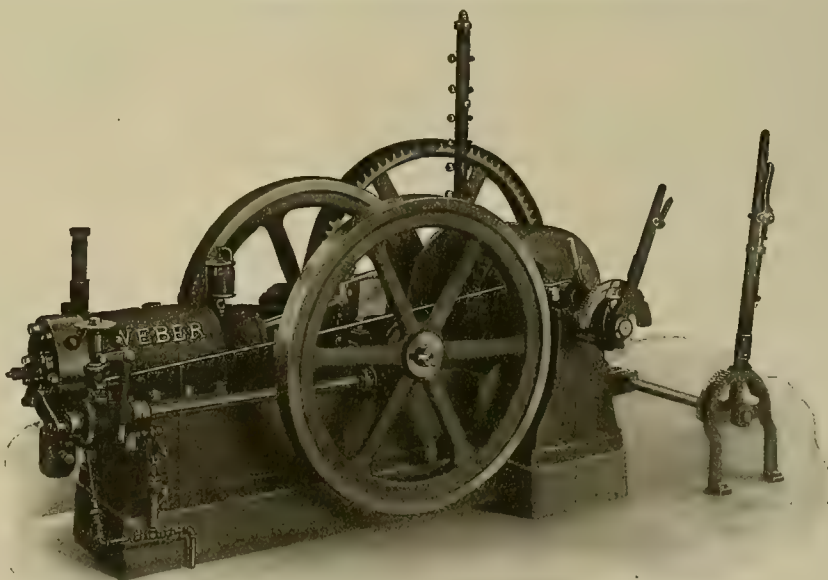
relation with transmitting pulley or drum, a bell crank lever having one end presented in a direction to impart longitudinal movement to clutch, and a rock shaft parallel with continuously rotating shaft having oppositely projecting levers connected respectively with brake band lever and bell crank lever and thereby adapted to impart movements transversely and longitudinally of rotating shaft and throw reversing gear and friction clutch alternately into and out of driving relation to transmitting pulley or drum.

ART OF EXTRACTING GOLD FROM REFRACTORY ORES.—No. 685,691; R. McKnight, New York, N. Y.



Treating refractory ores containing precious metals and a refractory metalloid by pulverizing the ore, mixing with pulverized ore a quantity of haloid salt of an alkaline metal, relative proportions of materials being those quantitatively requisite to produce, when heated in presence of oxygen, a haloid salt of precious metal, and an oxygen salt of alkaline metal and refractory metalloid, roasting mixture with free access of air and agitation at a temperature sufficient to effect reaction mentioned, but shut off from products of combustion until reactions above mentioned are accomplished, and volatilizing and recovering precious metal values as haloids or oxyhaloids.

THE coefficient of friction varies largely with the different kinds of metals, the lubricant, pressure, temperature, velocity. Prof. Thurston's experiments with steel journals running in bronze boxes lubricated with sperm oil, gave some curious results. For instance, with a speed of 30 feet per minute, 200 pounds pressure per square inch, and at a temperature of 90°, the coefficient was .0056. By increasing the temperature to 150°, leaving the other conditions the same, the coefficient rose to .05. Again, with 1200 feet per minute, 200 pounds pressure per square inch, and a temperature of 90°, the coefficient was .01; then by increasing the temperature to 150° without making any other change, it fell to .006. With 100 feet per minute, 50 pounds pressure per square inch, the coefficient was .0037 and did not change when the temperature varied, by 10° to an experiment, from 90° to 150°. There are other instances given in the hundred and over experiments, where the coefficients scattered over a wide expanse, when pressures, temperatures and speeds were changed, the lowest was when the pressure was 100, .0019 pounds per square inch, the speed 100 feet per minute, and the temperature anywhere from 90° to 130°, and the highest, .125, with a pressure of 4 pounds per square inch, speed 30 feet per minute, and the temperature anywhere from 120° to 150°.



Gasoline Hoisting Engine.

Herewith is depicted the latest production of the Weber Gas and Gasoline Engine Co., in a gasoline hoisting engine. They have been building gasoline engines for sixteen years at Kansas City, Mo., and claim ability to make such hoists as illustrated with all the latest improvements. They write that their

hoists are in use at 13,500 feet altitude, and at some points in Mexico and Arizona in mines below sea level. These hoists are fitted with ring oiling main bearings; circuit breakers for prolonging the life of the battery; toggle joint clutch mechanism, designed to prevent any thrust on main shaft; speeding device for controlling the hoisting speed; and indicators, showing the location of load.

MINING SUMMARY.

Specially compiled and reported for the
MINING AND SCIENTIFIC PRESS.

ALASKA.

KETCHIKAN.

The Unuk River M., S. & Trans. Co. is a Danville, Ill., corporation, organized under Oklahoma laws, with W. T. Cook, president; J. T. McMillan, secretary, and J. W. Dailey, manager, with office at Ketchikan. This company has bought claims on the Unuk river, about 40 miles upstream. A 25-ton milling and chlorination plant is to be installed next spring. There will be about fifty tons of machinery, which will be towed up the Unak river in flat boats hauled by a steam winch.

At the Iron Crow group at Tolstoi bay, on Prince of Wales island, J. Harvey, manager, says that development has opened a body of rich ore, going about 6% in copper. That is equal to a gross copper value of \$20 a ton, the property being situated on tidewater. The diamond drilling in the Iron Crow group, he states, was not a success through the machinery breaking down. A tunnel on the ore body is in about 20 feet.

VALDEZ.

The economical features of the proposed railroad from Valdez to the Yukon river seem to be such that the undertaking is not as difficult as was originally supposed. The summary of the survey shows that the 130 miles of railway necessary to complete the road to the Kinicott group of copper mines would require but little engineering beyond that of the ordinary mountain road in the more temperate climates. From the copper mines to the Yukon river would be comparatively easy. Engineer Gillette says the highest altitude reached by the line would be 1700 feet. Only one bridge would be required. The cost of construction is estimated by two engineers at \$22,500 and \$25,000 a mile for the construction in the Coast Range, and for the entire length of the line agree on \$15,000 a mile. The Kinicott mine owners claim that they have sufficient ore in sight to justify the expense of building the road, and propose to bring the project before railway promoters of San Francisco, Cal., for action.

ARIZONA.

COCHISE COUNTY.

The combination shaft of the Tombstone Con. Mines at Tombstone is down 500 feet, only 20 feet more remaining to reach the water level. Sinking has been temporarily discontinued. The cutting out of pump stations is being done. At the same time drifts for air are being run to connect with the old workings of the Grand Central and Contention mines.

GILA COUNTY.

C. Kurtz, who has a bond on the Banker group of copper claims near Globe, is taking out ore for shipment.

Larson & Campbell have sold a group of silver-lead claims 8 miles southwest of Bowie to M. E. Kinchila for, it is reported, about \$20,000. The mines have been taken over by the Buckeye M. Co., who propose to install a 50-ton concentrator.

MOHAVE COUNTY.

S. C. Bagg, Supt. of the New Comstock M. Co., reports that the shaft on its mines near Kingman is now below the 125-foot level, in a high grade of gold-bearing ore. The company has leased the Pyramid 20-stamp mill to work ores from the mine.

The option on the Railroad mine, near Chloride, recently given G. H. Hooper, has been taken over by the people representing the Gold Road group. A contract to sink 100 feet on the mine has been let to T. Clark, C. Driscoll and F. Pomeroy.

SANTA CRUZ COUNTY.

A strike has been made on the 50-foot level in the Buena Vista mine at Patagonia of copper glance, running 25% copper and also rich in gold and silver. The pay streak is 18 inches wide.

YAVAPAI COUNTY.

M. R. Kiley of the Oro M. Co., operating gold quartz properties near Minnehaha, reports that 1500 feet of development work has been done. The ore body ranges from 6 to 12 feet wide. A 125-ton reduction plant is under construction.

Hooker & McFarland, who are working the Texas, Black Bart and Iron Rust mines near Jerome, in sinking the shaft, at 90 feet depth cut a 15-foot ledge of ore carrying from 7% to 20% copper.

YUMA COUNTY.

The Colorado River G. & C. Co. of Los Angeles, Cal., has decided to erect a 10-ton smelter on their mine near Parker. J. C. Schelberger of San Pedro, Cal., is manager.

CALIFORNIA.

AMADOR COUNTY.

E. Kuchenbacker has leased the tailings plant at the Central Eureka mine, at Sutter Creek, from W. Dennis.

In drifting on the 800-foot level of the Peerless mine, near Jackson, 2 feet of quartz of fair milling quality have been struck.

CALAVERAS COUNTY.

The gravel mine at Mineral station, near Buckeye, recently discovered by P. Lancelle, has been bonded to P. L. Shuman of the North Star G. M. Co. at \$25,000. Work on the mine has been started.

The Fanny Marie G. M. Co. has bonded the Bluejay and Summit quartz mines, near Jesus Maria, from F. O. Cortmarsh of San Andreas and J. Gnecco of Jesus Maria at \$5000, to be paid in monthly installments of \$500 each. It is proposed to start a tunnel on the vein where backs of 800 feet can be secured.

The Emma mine, near Valley Spring, owned by Brown, Reed & McSorley, has recently been bonded by the McSorley Bros. Machinery is to be put up at once. At present there is a shaft 130 feet deep on the mine. The vein disclosed is 17 feet wide, the fissure being filled with decomposed quartz mixed with slate and other material, the whole of which prospects well. A steam hoist and a 10-stamp mill are being erected.

The American Pacific M. & Dev. Co. has bought the Nigger Hill gravel mine near Campo Seco, and will at once commence active operations. This mine was hydraulicked in early days and paid well. Later exploration has developed a large body of cement gravel on the top of the hill, which will pay by stamp milling. This cement overlies a large body of blue cement gravel. The purpose of the company is at present to work only the upper deposit. A mill is to be erected at once to crush the cement.

The Buena Vista C. M. Co. is the owner of the old Bull Run copper mine, between Valley Spring and Buena Vista, which was exploited during the copper excitement of the early 60's, at which time a shaft 450 feet deep was sunk. The rock prospects well in both copper and gold. It is now proposed to reopen the mine on a large scale.

EL DORADO COUNTY.

At the Josephine mine, Volcanoville, tunnel No. 5 is being advanced 20 to 25 feet a week. Two shifts are employed under the superintendency of J. M. Nougues, Jr.

The Lukens & DuBois claim, near Cool, is being opened up. W. McKoy is Supt.

J. Sipp is reopening his quartz claims near Greenwood. There is a 10-stamp mill on the property.

KERN COUNTY.

The Santa Paula M. & Red. Co., near Randsburg, J. Starr, Supt., has started up its stamp mill.

MARIPOSA COUNTY.

Work on the Pocahontas copper mine, near Mariposa, has been suspended. So far the work has been above water level and is 135 feet deep. Some of the last ore taken out is said to have averaged about 50% copper.

NEVADA COUNTY.

The South Idaho M. Co. has bonded their mine at Grass Valley to J. E. Carter of Grass Valley for two years at \$50,000. The ledge is parallel to the Idaho. No work has been done on the property for the past seven years.

PLACER COUNTY.

The new road to Shady Run quartz mine has been completed. A 5-stamp mill will immediately be installed. The mine, which is on the American river, south of Shady Run, has been prospected by a tunnel run in on the ledge 570 feet. Six crosscuts have been made and the ledge runs from 19 to 36 feet in width. A shaft sunk on the mountain side 212 feet connects with the main tunnel. J. E. Fisher is president of the company.

PLUMAS COUNTY.

At the Jamison mine at Johnstown the important development of the past season is a new ledge struck in an upraise from the drain tunnel level. It carries a good grade of ore.

SAN DIEGO COUNTY.

(Special Correspondence).—A reduction plant of 1000 tons capacity will be put in at the California King Mines Co., on the Colorado river, at Picacho, 20 miles north of Yuma, Ariz. The directors of this company include Senator J. P. Jones of Nevada, ex-Gov. J. B. Grant of Colorado, ex-Senator Pettigrew of South Dakota and ex-Senator S. W. Dorsey. The mine is 4½ miles from the river and is developed by open cuts and quarry work. A railroad, 36-inch gauge, is being built from the mine to the mill. The ore is to be

loaded upon the cars by a steam shovel. The mill will receive the ore from a storage bin at the head of the building, carrying it over a screening device which separates it into two parts, the coarse going to a crusher, thence to a second storage bin; from the latter the material will be fed by automatic feeders to 40x16-inch roughing rolls. From the latter the product will pass to a 16-inch bucket elevator, thence to Colorado Iron Works vibrating screens, which will classify into three sizes. The coarse will be carried back to roughing rolls, the next size going to 54x8-inch high-speed rolls, the finer size to a set of 42x6-inch rolls. The entire product will be thus reduced to 20-mesh, which will be delivered to a system of dust-proof storage bins, to be drawn automatically from the latter to cyanide leaching tanks, of which there are ten, each tank being 40 feet diameter by 5 feet deep. At the conclusion of the leaching and extraction the pulp will be sluiced out through gates. Below the leaching tanks will be a system of gold solution tanks, from which solution can be drawn into zinc boxes for precipitation. The power to operate the mill will comprise five 80 H. P.-return tubular steel boilers and a 24x48 inch Corliss engine. Picacho, Nov. 4.

SHASTA COUNTY.

The Enterprise G., S. & C. M. Co. has been incorporated, to work mines it owns in Pittsburg district; the capital is \$200,000 and the directors are C. Abbott, W. Fluke, H. W. Brooks, W. B. Keeney and C. Stabler of Redding.

J. Lyons and H. W. Carson are not entitled to possession of the Taylor placer claim of twenty acres adjoining the townsite of DeLamar. In the case of M. E. Dittmer and G. W. Girdner vs. Lyons and Carson, for its possession, judgment has been given for plaintiffs.

SISKIYOU COUNTY.

Newkirk & Co. are building a ditch from McKinley creek, near Yreka, to Buckeye Bar, on Klamath river, to be ready when the rains come. The mine is to be worked by an elevator and hydraulic plant.

The Deadwood Placer M. Co. will begin operations shortly by building a hydraulic plant under the supervision of Mr. Graves of Yreka. The intention is to be ready to start this winter.

Martin & Perkins are taking out some very rich ore from the McKinley mine, near Yreka.

The McCook mine, on Punch creek, near Yreka, it is reported, is showing a 3-foot ledge of quartz, which the owners believe will average \$50 per ton.

TRINITY COUNTY.

E. B. Johns of Sherwood, New River district, says the Valencia G. & C. M. Co. has eight claims on the East Fork of New river. The company intends sinking a shaft and doing development work until next spring, when they will erect a small prospecting smelter. The ledge is 30 feet wide and carries copper, gold and silver. The assays show 24% of copper in the ore. In addition to development work, they have made 10 miles of trail. The company also owns gravel bars on New river, and intends putting in a hydraulic plant to operate in the spring.

W. L. Harvey, manager of the Trinity Placer M. Co. operating on Cedar Flat, below Weaverville, says work is being pushed on the Hammer & Kalkhla placer mine, at the junction of the South Fork and Trinity river. The gravel, which is rich, lies in benches, rising from 150 to 850 feet above the river. Twenty-two prospecting shafts and tunnels have been run in the gravel and it runs from 10 cents to \$13.50 a cubic yard.

At the Swanson mine a force of men is drifting and making \$10 a day to the hand.

W. D. Moody has opened the pay streak on his placer mine on New York bar; it pays 25 cents a cubic yard.

The Lappin mine at Deadwood, owned by Cochran, Brady & Tourtellotte, has been sold to Pittsburg capitalists. F. Hollingsworth is superintendent for the new owners, who contemplate the erection of a 10-stamp mill to be run by electricity.

TUOLUMNE COUNTY.

The mill at the Mt. Jefferson mine, near Groveland, has been started up after a shut down of several months. About twenty men are now at work. The new hoist is in working order, the rails in the new shaft are in place and hoisting being done.

W. Symons and J. Sorensen are sinking a shaft on the South Carolina mine at Carters and will make a mill test of thirty or forty tons of ore.

A suit to recover the possession of the Jim Blaine mining claim, near Sonora, has been brought by the Yosemite G. M. & M. Co. against F. F. Britton, F. L. Emerson, R. Van Norton and C. Bigelow.

COLORADO.

CLEAR CREEK COUNTY.

At the Empire tunnel at Georgetown, an average of 6 feet daily is being made.

GILPIN COUNTY.

H. H. Barbee of Denver says the Grand Central G. M. Co. will build a 50 or 100-ton mill to treat the ore from their own mines and to handle custom ores.

The erection of a concentration mill close to the dump of the Bonanza tunnel, near Black Hawk, which intersects the veins in Maryland mountain, is being talked of. The ore bodies opened up in the veins cut, it is claimed, are enough for a 100-ton plant.

SUMMIT COUNTY.

(Special Correspondence).—The Ten Mile L. & M. Co. has holdings amounting to 150 acres at Robinson, and this area includes the old New York group, originally located as a placer property. Prior to 1893 a production of \$318,000 was taken from an ore shoot opened by a shaft on the latter. Work is in progress to get the same ore shoot on its dip at greater depth. The ore produced consists of an iron and lead sulphide carrying 10% to 12% lead and good values in silver and gold. H. M. Shepard of Leadville is Supt.

The Robinson Con. Smelting & Mining Co., which owns 250 acres of mining ground at Robinson, will soon have completed a pyritic smelting plant at the latter place. It is being equipped with three furnaces. This company's mines are pretty well opened up, and the presumption is that their smelting plant will operate mainly on their own ores. Frank Bulkeley is general manager.

The Half Moon is shipping a small tonnage of high-grade ore. It is being operated by Colorado Springs parties.

Robinson, Oct. 29.

TELLER COUNTY.

The Taylor & Brunton people, it is reported, have decided to build a new sampler at Goldfield.

The deepest shaft in Cripple Creek district is the American Eagle, on Bull hill, owned by W. S. Stratton, which is down 1600 feet, where it is connected with the 1300-foot level of the John A. Logan and with the Orpha May. At the present time the ore output from the shaft is five carloads a week.

The Victor G. M. Co. has made arrangements to put an electric hoist on the Indicator claim, adjoining the Victor, at Cripple Creek. At 65 feet depth a good strong vein, that assays from \$18 to \$46 gold to the ton, has been struck.

While digging trenches for pipes in Cripple Creek streets, three veins of quartz were struck, assays from which run from \$30 to \$60 gold to the ton. The veins are from 6 inches to 1 foot in width. The Home M. Co. is exploiting these ledges. T. J. Moynahan, who owns 200 acres of the ground through which these shoots run, has leased it to E. F. Browne of Cripple Creek, at low royalty, with a bonus of \$1000 in cash the day he ships one carload of ore running \$25 to the ton from the property.

Twelve of the forty men employed on the Modoc mine, at Cripple Creek, have been laid off. The reason stated for the suspension is the high rate of smelter charges. The company purposes to break ore and store it with the remaining force until reductions are made in the charges.

A contract has just been let by the Woods Investment Co. for 600 feet of sinking from the tunnel level of the Ingham at Victor. The new shaft will facilitate and cheapen mining and have a better situation for dumping. Its completion will be followed, it is reported, by the installation of a large hoisting plant to sink 2000 feet.

D. Weyand sold to the Mary McKinney Co. the Nisi Prius claim at Cripple Creek, containing an acre of ground for \$4000. It was bought for dumping ground.

The Pinnacle G. M. Co. has started unwatering the main workings of their property, preparatory to resuming work on company account. The main shaft was sunk by Whipp & Glenn, leasers, who shipped ore to the value of over \$250,000.

IDAHO.

BLAINE COUNTY.

The Maggie and U. S. lode claims at Halley have been sold to an Eastern company, for whom F. Mandell is superintendent. The claims are believed to be on the same vein as the Minnie Moore.

J. B. Boyce, of Soldier, has sold to A. McCormick, of Soldier, a quarter interest in the Olympia and Sampson mines, situated in Little Smoky district, for \$6000.

LEMHI COUNTY.

J. E. Hibbs and J. Thompson, owners of the Granite mines, near Salmon, have a dyke of altered granite—sometimes called "satin spar"—which is \$10 and \$12 gold ore.

KOOTENAI COUNTY.

It is reported that a strike has been

on the Weber mine, near Lakeview, of the ore assaying as high as 1000 lbs of silver to the ton.
The Keep Cool mine, near Pend Oreille, the No. 4 tunnel is in 529 feet. The No. 5 tunnel, 100 feet deeper than No. 4, was advanced 650 feet, passing through 250 feet of ore. T. S. Smith of Spokane, Wash., president of the company, says that the mine is now good shape for the erection of a concentrator, and at the meeting of the company in January it will be decided whether to equip the mine with a concentrating plant or to pursue further developments in the way of deep sinking.

SHOSHONE COUNTY.

The American-Commander M. & M. Co., Ltd., has been incorporated with its office at E. J. Clark, president; F. J. Edwards, secretary. The purpose of the company is to develop the American and the Commander claims at Black Lake.

WASHINGTON COUNTY.

Special Correspondence.—Ford Bros. are operating in placer basin at Black Lake. At the latter place the Idaho Gold Coin M. Co., organized by the Fords, owns large surface holdings, with extensive underground development, yielding good veins of ore. The past season a 50-ton cyanide plant was erected. They have also arranged to utilize water power at White Horse falls. Black Lake is the head of Rapid river, in Seven Devils range, the Rapid flowing into the Lake Salmon.

KANSAS.

The reported action of the Union Pacific Railroad in withdrawing from the market nearly 50,000 acres of land in Trego and El counties has attracted attention to the old excitement in western Kansas. A number of chemists have visited the region, claiming as gold bearing and it is reported that some of them declare that the shale along that river will produce from \$10 to \$20 per ton in gold and \$6 to \$10 in silver. Two mills are now building in El county in the district, and Smoky Hill City has grown to considerable proportions in a month. It is said about \$50,000 has been invested in lands of no value for any other purpose. The shale lands extend 50 miles along the river and are on either side.

MONTANA.

CASCADE COUNTY.

Two feet of ore, assaying from 17% to 22% copper, has been struck in the tunnel of the Canyon G. & C. Co., near Canyon Ferry. The new strike was made at a depth of 180 feet.

DEER LODGE COUNTY.

A. Frank and J. M. McDonald of Butte and Omaha associates have bought the quartz claim at the head of Dry Cottonwood creek, near Anaconda, and are putting machinery on it preparatory to extensive development.

GALLATIN COUNTY.

The corundum mines on Camp creek are being worked by McCoy & Klein. It is understood that the operators will ship shipments of ore weekly to Butte.

LEWIS AND CLARKE COUNTY.

A contract has been let by the Snow-C. M. Co., Martin & Canoll of Helena, managers, for 300 feet of tunnel on the McDonald group, near Elliston, on the valley. The new tunnel will open up the lead to a depth of 250 feet.
In addition to the Sunrise mill, near Phillipsburg, has been completed.
The Bellflower, at Phillipsburg, owned by the McLure syndicate, the shaft is down 300 feet and crosscutting to the lead is now in progress.

MADISON COUNTY.

The water power plant now being erected near Red Bluff, when completed, will be one of the largest in the Northwest. The purpose is to supply electrical power at Butte. There will be two generators, each of 5000 H. P. The flume dimensions are 16x10 feet in the clear. It will be miles long and take the entire flow of a river, except in the season of freshets. The plant is nearing completion.
The Fisher & Co. of Butte have bought the Black Chief and Black Boss mines at Pony, owned by Northey & Martin. Operation is to commence immediately.

J. Fine and associates have bonded the fourth of July mines, near Pony.
The Nugget Gulch M. Co. and the Stone Creek M. Co. are about to consolidate as the Bismarck M. & M. Co. A joint stockholders' meeting is to be held in Chicago soon to effect this. It is reported the Stone Creek Co. owns sixteen claims on Stone creek, and the Nugget claims near Twin Bridges, with considerable ore on the dumps.

SILVER BOW COUNTY.

A strike has been made in the Emma mine at Butte, in a new section of the district. The vein is 15 feet in width and assays all the way from \$20 to \$167. It has been decided to sink the shaft 800 feet.

J. A. Murray is working the Ticon mine, near Butte, with P. Delmas Supt. The shaft is down about 400 feet. The development work consists of shafts and drifts, from which ore is being shipped, the returns on which defray expenses of the development. The ore of the Ticon is copper and silver-bearing, the former metal predominating.

NEVADA.

ELKO COUNTY.

Slimes to the amount of 30,000 tons, estimated to contain about \$200,000, are piled up by the Dexter M. Co. at Tuscarora, waiting for some metallurgist to undertake the treatment, so states President J. Dern. A sampling of the slimes showed nearly \$7 gold per ton.

HUMBOLDT COUNTY.

A strike is reported in the Anderson mine, near Mill City. The mine is being operated by a Boston, Mass., company, with F. H. Lowe as manager. An assay of the ore is reported to have returned \$107.60 silver and \$34 gold. The tunnel is in 130 feet.

LANDER COUNTY.

The Gold Park M. & M. Co., with works at Gold Park and office at Austin, has been incorporated with \$1,000,000 capital; T. H. Dalton is president of the company.

NEW MEXICO.

BERNALILLO COUNTY.

The Jura-Trias Co. has completed its copper smelter at Senorita. It owns four copper claims, with considerable development work upon them. The ore ranges from 7% to 25% copper.

COLFAX COUNTY.

(Special Correspondence).—The Ohio G. M. Co. will erect a 50-ton pneumatic cyanide reduction plant on their property at Elizabethtown. C. E. Fueller, M. E., of Denver, Colo., was on the ground last week selecting a site and making preliminary plans for the mill.
Elizabethtown, Nov. 3.

OTERO COUNTY.

T. A. Kelly has leased the Mamie Baird mine at Jarilla and started work on it.

The Jarilla Copper Co. is drifting on the first level on good copper ore and sinking the shaft to the second level.

The Altamont M. Co., at Jarilla, has its shaft down 200 feet and has 10 inches of high-grade silver and lead ore which runs over 4000 ounces silver and 17% lead per ton. The company has installed a gasoline hoist.

SANTA FE COUNTY.

The San Lazarus M. Co., \$5,000,000 capital, has been incorporated to work the San Lazarus group of fourteen claims in the southern part of Santa Fe county, on which it has already expended \$130,000. The office of the company will be at Milwaukee, Wis.

The Belle Royal M. Co. owns ninety acres of mineral land in the Bromide district. Assays give returns of 15% to 25% copper, ten ounces silver and smaller values in gold to the ton.

SOCORRO COUNTY.

The Little Charlie mines, in the Mogollon district, will be operated by the Mogollon G. & C. Co.

OREGON.

BAKER COUNTY.

E. A. Frenzel of California has bought the Tempest mine, in the Greenhorn district, near Baker City. Mr. Frenzel will erect a concentrating plant for the ores. He has also bought 320 acres of placer gold ground on Gold creek, together with water rights.

GRANT COUNTY.

A new ledge has been struck in the Cougar mine, near Granite. It is about 180 feet west of the present vein, and averages \$7 to \$21 to the ton. The lower tunnel is in 1050 feet, and will be advanced 300 feet from the present face, when a 475-foot upraise to the surface will be made. The cyanide plant will not be operated this season.

The Phoenix mine, near Granite, has been sold to Eastern people represented by W. R. Crawford. There is over 1000 feet of development on the Phoenix, 2300 tons of ore on the dumps and the 10-foot ledge, it is said, averages \$35 clear across. The price paid was about \$80,000. A 10-stamp mill will be erected at once.

JACKSON COUNTY.

H. A. Corliss has sold his placer mines in Dry Diggings district, near Gold Hill, to a Chicago company represented by C.

W. Ament for, it is reported, \$20,000.

Mr. Corliss is superintendent.
The Williamsburg M. Co. of Grants Pass has been incorporated, capital \$500,000, by F. E. Forbes, T. J. McClung, Robert G. Smith and L. A. Heberlie.

J. N. Hayes has rented his Sardine creek placer mines, near Jacksonville, to Medford people and is developing a quartz ledge, near Gold Hill, 5 feet wide, which 50 feet down assays \$24.08 copper and \$23.44 gold per ton.

Reed & Fletcher of Gold Hill, while developing one of their cinnabar claims in Meadows district, it is said, have cut through a 20-inch vein of good coal. The bed lies at a depth of 112 feet.

JOSEPHINE COUNTY.

B. F. Walker of Yreka, Cal., superintendent of a hydraulic mine at Althouse, says he is ready at the mine for the water to start operations.

LANE COUNTY.

The railway from Cottage Grove to the Bohemia district, about 40 miles distant, will open up a promising mining district. With the railway, ore can be brought to the smelters cheaply. Several hundred thousand dollars have been extracted from free-milling ores at Bohemia, but in depth sulphide ores predominate, with increased values. The Helena mine, since April 1, 1900, has paid \$104,000 dividends.

SOUTH DAKOTA.

LAWRENCE COUNTY.

D. N. Heizer and J. K. Vanatta of Denver, Colo., are in Deadwood preparing to immediately rebuild the burned plant of the Spearfish G. M. & R. Co. The loss was \$50,000; insurance, \$25,000. The old mill will be duplicated throughout. It will not be ready to run before next spring. The Spearfish Co. owns about 400 acres of mining land in the Spearfish mining district, 12 miles west of Deadwood.

The annual report of the Homestake M. Co. for the fiscal year ended May 31, 1900, shows total of ore milled at the five mills 935,441 tons, which netted \$3,588,654 on the plates, \$48,305 in concentrates and \$2,272 in siliceous ore, making a total of \$3,639,232 for the total output of the mine. The company paid out for mine labor \$1,226,143 and for mill and hoisting plant labor \$174,942. The amount paid for mine timbers was \$242,727, lumber \$8987, coal \$251,995, powder \$127,267, quicksilver \$9707 and candles \$26,700. The bullion averages about \$15 per ounce at New York. The company has paid a dividend of \$1,260,000 for the year. The 1200-ton cyanide plant was built at a cost of about \$300,000, and the water system of bringing into the city water from Spearfish creek, at a cost of \$1,000,000, was completed. At Terraville the old Caledonia stamp mill was repaired and twenty stamps added. The average yield per ton was \$3.90 in gold. Practically all of the values in the ore are now saved. The report was for the year previous to the commissioning of the 1200-ton cyanide plant, which is saving about 95 cents that formerly went down with the tailings into the creek.

The Dakota M. Co. will enlarge its 100-ton cyanide plant at Deadwood by ten additional stamps, increasing capacity to 150 tons. The ore comes from the company's mines in the Portland district, 6 miles west of Deadwood.

UTAH.

IRON COUNTY.

W. J. Halloran of Salt Lake City is at Stateline with reference to the erection of a mill to work the Johnny mine.

SALT LAKE COUNTY.

The capitalization of the United States M. Co. at Bingham and the Centennial-Eureka of Tintic has been increased from \$10,000,000 to \$12,500,000.

The Goodsell M. & M. Co. has been incorporated, capital \$350,000, with B. W. Goodsell president and W. L. Goodsell secretary. The company owns the Hot Stuff claim in the American Fork mining district.

The Alabama M. Co. has been incorporated, capital \$10,000, with C. D. Rogers as president and C. M. Nielsen secretary and treasurer, with office in Salt Lake City. The company owns the Legal Light claims Nos. 1, 2, 3 and 4, in Bear canyon, near Draper.

In the Lavinia, at Alta, the tunnel, in 500 feet, has developed 3 feet of ore that averages 25% lead and twenty-five ounces silver, with a small amount of gold. The ore occurs on the hanging wall, while on the foot wall are 30 inches of ore that averages 15% copper and values in silver and gold.

SUMMIT COUNTY.

The Daly-Judge M. Co. has been incorporated in New Jersey, to operate on Bonanza Flat, near Park City. In the organization of the new company J. J. Daly, A. Fowler and O. J. Salisbury of Salt Lake City, H. O. Hanke of Cincinnati,

Ohio, A. C. Wall of New Jersey and E. H. Wood of New York are directors. J. J. Daly is president and G. W. Lambourne secretary. The new company owns fourteen full claims and part interests in a number of other adjacent ones.

WASHINGTON COUNTY.

S. Williams and S. S. Jones of Provo have bought the Surprise copper and lead mine at St. George and will build reduction works there.

WASHINGTON.

FERRY COUNTY.

J. Wyatt, Supt. of the Mountain Lion at Republic, says that the pump will be taken out of the lower level of the mine and, to save expense, the mine has been closed down and will not be reopened until transportation to the smelters is available, when it will require more than two weeks to pump it out. He says there are 15,000 tons of ore in the stopes ready to put into the cars.

OKANOGAN COUNTY.

R. Insinger, secretary at Spokane of the American Flag Co., operating in the Metkow district, states that the recently installed 20-stamp mill is in successful operation, making its first run.

SKYKOMISH COUNTY.

The Bunker Hill-Sullivan M. & Con. Co., who own the Copper Bell mine near Index, are installing an engine, boiler and air compressor plant for developing and exploiting the property on an extensive scale.

WYOMING.

CARBON COUNTY.

The owners of the new Rambler copper mine, in the Douglas Creek district, near Encampment, will, it is reported, make a contract with the Encampment smelter for an aerial tramway over 30 miles in length, to cost \$250,000.

It has been discovered that the dump of the Doane Rambler mine at Battle Lake contains about \$10 a ton, and the Battle Lake Tunnel Site Co. will work it. G. Doane, the original owner of the Rambler, worked the mine with coal miners, who shot the ore down in such fine particles that thousands of tons were carried out to the dump as waste. Recent assays have shown that the ore on the dump contains \$1.50 gold to the ton, \$2.40 silver and \$7 copper. There are about 9000 tons of ore in the dump, which is valued at \$90,000. It will cost half of this to reduce it to matte.

A strike of copper has been made in the Ottumwa mine, in the French Creek district, near Laramie. Assays show that the ore runs 20% copper and \$1.46 in gold to the ton.

Copper has been discovered on Rock creek, near Kemmerer. The find is black oxide of copper.

FOREIGN.

BRITISH COLUMBIA.

L. S. Austin, Supt. of the Sullivan Mines Smelter at Marysville, East Kootenay, says there will be two lead smelting furnaces, each of 125 tons capacity daily, and six or eight long-bedded hand roasting furnaces. A waterfall capable of developing 600 H. P. will be utilized for running the machinery and the plant will be ready to blow in by March 1, 1902.

The Snowshoe mine at Phoenix, A. J. McMillan managing director, has developed large bodies of ore, and the management is considering the question of treatment. The Snowshoe has shipped from 1500 to 1600 tons of ore to the Greenwood smelter, but it is understood the Snowshoe Co. propose erecting a smelting plant to treat its own ores.

M. B. Webber and associates of Winona, Minn., have bonded from T. Horn and H. N. Coursier of Revelstoke the Black Warrior group, in McDonald creek basin, upon which considerable work has been done. The price is \$60,000; time, two years. S. Shannon has been appointed Supt., and development work and shipments will be made during the winter.

W. Bailey, owning a ranch near the mouth of Wild Horse creek, has begun a suit and asked an injunction to restrain the placer companies now operating on Wild Horse creek from discharging mining debris in the river. The defendants to the suit are The Invicta G. M. Ltd., The Nip & Tuck Hy. M. Co., East Kootenay Consols, Ltd. (foreign company), The Quong Young Tong Co., Chow Dek and Chow Quen (Chinese companies).

DUTCH EAST INDIES.

C. H. Hand, mining engineer of Butte, Mont., who has been examining gold and copper mines in the Dutch East Indies, says of mineral resources in the northern peninsula of Celebes that he found some copper properties which promise to develop into exceedingly rich mines; but, as very little development work has been

done, it is impossible to tell much about them. It is the same with the gold properties. The native Malays have been digging gold in that country for many years, but when they came to water they abandoned their diggings. They have uncovered some ledges showing ore going from \$8 to \$40 a ton, and some of these mines are now being worked under concessions from the Dutch Government.

KLONDIKE.

It is reported that Indiana people are buying up interests on Gold hill, at the mouth of El Dorado, and intend to hydraulic the ground. Two large plants have been bought, water rights have been secured and six creek claims obtained for dumping ground. The whole frontage of Big Skookum, Bonanza and El Dorado has been secured. A number of dumps on the ground that were not washed up during the summer for lack of water have been tested, and it is estimated that they will yield at least \$150,000. A sluice head on Gold hill cost the miners \$14 per hour in the summer of 1900.

A new Klondike strike is reported on Conglomerate creek, a tributary of Montana creek.

MEXICO.

(Special Correspondence).—The Palmarijo & Mexican Gold Fields, Ltd., T. H. Oxniam manager, is overhauling its plant at Zapote and preparing to change the method of ore treatment about Dec. 1.

J. H. Furman and S. G. Burn have bought the Ramos mines for an English company represented by them. The mines include the El Durazno, Tetamoa and the San Agustine groups.

The White Chief M. & M. Co. have reduced their working force about half.

The Guazapares M. & M. Co. is starting the construction of its mill.

Zapote, Sonora, Oct. 22.

Cananea rancho, consisting of 350,000 acres, has been sold to the Greene Con. Copper M. Co. by George C. Perkins of San Francisco and associates. The rancho extends from the Arizona boundary south into the State of Sonora, and contains within it the Cananea copper mines. The price paid for the rancho, it is said, was about \$350,000.

The Emerald M. & S. Co., W. R. Ramsdell of San Diego, Cal., manager, is operating copper mines at Santa Catrina, Lower California. The company has recently bought a lot of anchors, one weighing 10,000 pounds, two of 3000 pounds, and two of 3500 pounds. The four smaller anchors are for mooring vessels at Santa Catrina to load with copper ore, and the large anchor is to fasten the cable upon which buckets laden with ore will travel from the shore to the vessels. This cable will be anchored some distance from the shore and when a vessel comes to load the cable will pass between the masts. As the buckets reach a point over the hold of the vessel they will be emptied and then returned to the shore to be refilled. By this means from 200 to 300 tons of ore can be put on board a vessel in one day. For over a year the company has been at work developing its mine, and now has about 150 men employed. A tramroad is being built from the mines to the coast. As soon as the preliminary work is completed the company expect to ship at least 2000 tons of ore a month to smelting works at San Francisco. On the vessel reaching Ensenada every cargo has to be sampled and a charge of \$2 (Mexican) is levied on every ton, being what is known under the Mexican laws as a traffic tax.

The Cieneguita Co., consisting of Phoenix and Tucson, Ariz., people, is arranging to work their Chipiona and other mines in the Sahuaripa district of Sonora. A. Hendy is manager at Nogales.

PERU.

Butte, Mont., and New York City people, associated with A. W. McCune of Salt Lake City, Utah, it is reported, have arranged to purchase the Sierra de Pasco silver and copper mines in the Andes mountains, 210 miles from Lima. The company has a capital of \$10,000,000. The mine has been worked by natives for 271 years, and it is claimed that fully \$1,000,000,000 have been taken out in silver, but immense deposits of copper ore remain untouched. The silver ore is high grade, but the copper is not. Mr. McCune, it is said, will be manager of the property.

Catalogues Received.

The Taylor Iron and Steel Co., of High Bridge, N. J., has issued Catalogue A, describing and illustrating its special lines of manufactures in manganese and chrome steel. These consist of wearing parts of many mechanical appliances used about mining and mill plants. The Taylor Iron and Steel Co. will be pleased to mail the catalogue on application for it.

Personal.

W. G. FILER of Salt Lake City, Utah, is at Redding, Cal.

WALTER SMITH is now Supt. Sedalia mine, Salida, Colo.

CLARENCE HERSEY has returned from Utah to Leadville, Colo.

A. C. BEATTIE, M. E., of Denver, Colo., is away on a trip to Mexico.

F. S. ROUMAGE of Auburn, Cal., is sojourning in San Francisco.

A. T. AMES, the pump manufacturer of Galt, Cal., is in San Francisco.

E. RAMMELMEYER is the new Supt. of the New Fairview M. Co., Fairview, B. C.

A. P. FORBES, a mining engineer, has gone from San Francisco to Ocatla, Mexico.

H. BRATNOBER, who was at Rosslund, B. C., for several weeks, has gone to London.

R. G. PARKER of Boston, Mass., is examining copper prospects in northern California.

E. M. BIND, who has been at Torreon, Coahuila, Mexico, for some time, is now in New York.

G. A. BIGELOW has returned to San Francisco from Nome, where he spent two seasons.

R. H. CAMPBELL, formerly of Etna, Siskiyou county, Cal., is at Harpers' Camp, B. C.

O. P. POSEY, manager Bingham Con. Smelter at Bingham Junction, Utah, is in Chicago, Ill.

J. W. ASTLEY has been appointed superintendent of the Snowshoe mine, at Phoenix, B. C.

C. L. DOOLEY has returned to Michigan Bluff, Cal., from a year's absence engaged in mining in Siberia.

M. M. JOHNSON has returned to Salt Lake City, Utah, after several weeks' sojourn in New York.

J. HARVEY, Supt. Iron Crow copper mine, near Ketchikan, Alaska, is sojourning at Spokane, Wash.

EDW. PEACOCK has assumed the superintendency of the Bristol Copper Co.'s property near Pioche, Nev.

A. E. RITER of Hope, Idaho, visited Dixie, Idaho, this week to examine some property for Spokane men.

R. E. HANLEY, of the Niagara mine, French Gulch, Cal., is now Supt. Shasta King mine, Shasta Co., Cal.

P. L. YOUNG has returned to Orleans, Cal., from a reconnaissance of the Portuguese, East Africa, gold coast.

J. H. COX of Denver will make a reconnaissance of the Congo river country, Africa, for the Venture Exploration Co.

BELA KADISH has resigned as Supt. Le Roi smelter at Northport, Wash. Oscar Szontagh is his probable successor.

EDW. MANION has resigned the superintendency of the Gopher mine, Hill City, S. D., to be Supt. Clyde mine, Victor, Colo.

N. E. LINSLEY, M. E., has returned to Spokane, Wash., from an examination of the North Fork coal fields, near Phoenix, B. C.

W. E. SHARON succeeds Albert Lackey in the superintendency of the Overman and Caledonia mines, Virginia City, Nevada.

E. L. LEAVER of Chas. Butters & Co. is building a reduction works at Virginia City, Nev., for utilizing the lixiviation process.

M. FONTAINE of Paris, France, is at Clifton, Ariz., engaged in inspecting the mines of the Clifton Consolidated Copper Mines, Ltd.

E. K. STEVENOT has returned from San Francisco to the Oriole mine, Calaveras Co., Cal., where he is superintending operations.

LEO VON ROSENBERG of New York is examining a copper property near Hawthorne, Nev., and expects to be in California next week.

LEWIS SCHATZ, erecting engineer for the Allis-Chalmers Co., is putting in a blowing engine for the Mountain Copper Co. at Keswick, Cal.

W. N. WILBUR, formerly of Yreka, Cal., is now engineer for the Golden District P. M. Co., in the Mount Baker district, Washington.

J. O. HARRON of the firm of Harron, Rickard & McCone, successors to the Parke & Lacy Co., returns to San Francisco from an Eastern trip this week.

P. OREN of Butte, Mont., has gone to Peru in charge of a party of expert miners to open the Cerro del Pasco mines for the New York company lately organized.

E. H. BENJAMIN, secretary California State Miners' Association, has gone to the city of Mexico, where he will attend the

annual meeting of the American Institute of Mining Engineers.

COLONEL C. E. L. B. DAVIS, COLONEL W. H. HEUER and MAJOR W. E. BIRKHEIMER of the United States Engineer Corps have gone from San Francisco to Manila to examine proposed improvements in the Philippines.

Commercial Paragraphs.

C. M. FUELLER has opened an assay and testing plant in Denver, Colo.

McFARLANE & Co., Denver, Colo., are building a stamp mill for the Idaho Springs Mining & Reduction Co.

HENRY ENGELS, 421 Market St., San Francisco, Cal., is the Pacific coast representative of the Chicago Pneumatic Tool Co., Monadnock Block, Chicago, Ill.

THE Compressed Air Machinery Co. expect to occupy their new five-story building, southeast corner First and Stevenson Sts., San Francisco, Cal., next month.

THE Colorado Iron Works have completed a concentrating and lixiviation plant for the San Luis M. Co., at Panuco de Coronado, Durango, Mexico, and a modern concentrating plant of 1000 tons daily capacity, for the Federal Lead Co., at Flat River, Mo.

THE S. Morgan Smith Co., York, Pa., has an order for six single 39-inch and one 18-inch McCormick turbines from the Metabetchouan Pulp Co., Quebec, each mounted in an iron flume connected to a supply pipe 16 feet diameter. Five of the 39-inch turbines will develop 4000 H. P. and drive ten pulp grinders. Another of same size will drive the wet machines, screens and other machinery. The 18-inch will operate a dynamo, head 46 feet. The mill will have a daily capacity of sixty tons pulp, dry weight.

THE New Process Raw Hide Co., Syracuse, N. Y., through its English agents, Messrs. Geo. Angus & Co., has received during the month of October trial orders for its new process noiseless pinions from eleven electric railway companies in Great Britain. The company reports its trade in the general machinery line as steadily increasing, especially in the case of motor-driven machine tools where noiselessness is essential. Since the company's announcement a couple of months ago that it is in position to furnish accurately cut metal gears also, the number of orders received for work in this line has been gratifying and point to an extended trade.

Recently Declared Mining Dividends.

| | Payable. |
|-----------------------------------------------------------------------|----------|
| Standard Con. M. Co., California, 10 cents per share..... | Oct. 31 |
| Carissa M. Co., Utah, No. 2, 3 cents per share..... | Oct. 8 |
| The Bunker Hill & Sullivan M. & C. Co., \$21,000..... | Nov. 4 |
| Daly-West S. M. Co., Utah, monthly, 40 cents per share, \$60,000..... | Nov. 15 |

New Patents.

DEWEY, STRONG & Co.'s SCIENTIFIC PRESS PATENT AGENCY, 330 Market St., S. F., has official reports of the following U. S. patents issued to Pacific coast inventors:

| | |
|----------------------------------------------------------------------|--|
| 585,502.—ANIMAL TRAP—T. Ainsworth, Pleasanton, Cal. | |
| 585,389.—T SQUARE—J. D. Barrie, Los Angeles, Cal. | |
| 585,419.—MILKING STOOL—J. H. Beattie, Puyallup, Wash. | |
| 585,563.—STEAM ENGINE—R. H. Botts, Richmond, Cal. | |
| 585,672.—CORONET ROLLS—A. C. Calkins, Los Angeles, Cal. | |
| 585,574.—HAND CASE—J. A. Conbole, Virginia, Nev. | |
| 585,400.—PRINTING PRESS—A. O. Hayes, Los Angeles, Cal. | |
| 585,685.—POWER GENERATOR—E. Krahenbuhl, San Rafael, Cal. | |
| 585,384.—TRUNK—J. Longshore, Jr., Sacramento, Cal. | |
| 585,642.—COIN CONTROLLED APPARATUS—W. F. M. Ricketts, Pullman, Wash. | |
| 585,412.—THRILL COUPLING—G. L. Shermerhorn, Medford, Or. | |
| 585,693.—SIGNATURE GATHERER—J. E. Smyth, Pasadena, Cal. | |
| 585,398.—DOOR CHECK—Stewart & Snyder, Medford, Or. | |
| 585,389.—WRENCH—J. B. Tupper, S. F. | |
| 585,361.—NEEDLE HOLDER—G. H. Wartman, Montebello, Wash. | |
| 585,363.—LOCKING HOOK—E. L. Weed, Baker City, Ore. | |
| 585,547.—WEATHER STRIP—B. M. Whiting, Spokane, Wash. | |
| 585,704.—AIR COMPRESSOR—M. C. Wilkinson, Los Angeles, Cal. | |
| 585,366.—WINDOW SHADE FIXTURE—F. Winne, Colusa, Cal. | |
| 585,660.—LAVATORY—G. L. Woodworth, Stanford, Cal. | |
| 35,240.—DESIGN—S. L. S. Stickle, Santa Barbara, Cal. | |

Books Received.

"Micrometrical Observations of the Double Stars Discovered at Pulkowa Made at the University of California," by

W. J. Hussey, Astronomer. Vol. quarto, 225 pages. The work consists of a record of observations of double stars and their movements; of interest to astronomers. Published by University of California, Berkeley, Cal.

Latest Market Report.

SAN FRANCISCO, Nov. 7, 1900.

SILVER.—Per oz., Troy: London, 26½d (standard ounce, 925 fine); New York, bar silver, 57½c (1000 fine); San Francisco, 57½c; Mexican dollars, San Francisco, 45½c New York.

COPPER.—New York: Lake, 15 casks, \$17.25; carload lots, \$17.00; electrolytic, 1 to 3 casks, \$16.75; carload lots, \$16.62; Casting, 1 to 3 casks, \$16.00; carload lots, 16.50. San Francisco: 18. Mill copper plates, 20c; bars, 22½c. London: £64 17s 6d per ton.

LEAD.—New York, \$4.37½; Salt Lake City, \$4.00; St. Louis, \$4.40; San Francisco, \$4.90, carload lots; 5½c 1000 to 2000 lbs.; pipe 6, sheet 6½, bar 5½c; pig, 25. London, £11 8s 9d per ton—2.46 cts. per lb.

SPELTER.—New York, \$4.25; St. Louis, \$3.75; London, £16 2s 6d per ton—3.58½ cts. per lb; San Francisco, 10½c; 100-lb lots, 6c.

ANTIMONY.—New York, Cook's, 10c; Hallett's, 9c; San Francisco, 100-lb. lots, 10c; 300 to 500 lbs., 11c; 1-lb. lots, 13½c.

IRON.—Pittsburg, Bessemer pig, \$1.00; gray forge, \$1.00; San Francisco, bar per lb., 2.65c in small quantities.

STEEL.—Bessemer billets, Pittsburg, \$24; open hearth billets, \$26.50; San Francisco, bar, 7c to 12c per lb.

NICKEL.—New York, 50¢@60¢.

TIN.—New York, pig, \$27.50; San Francisco, ton lots, 28c; 1000 lbs., 28½¢; 500 lbs., 28½¢; 200 lbs., 28½¢; less, 29c; better, 30c.

QUICKSILVER.—New York, \$1.00; large lots; London, £9 2s 6d; San Francisco, local, \$47.50 per flask of 76½ lbs. Export, \$45.00.

MAGNESIUM.—New York, \$2.90; San Francisco, \$3.75.

ZINC.—San Francisco, 5½c; slab, 7c; bar, 7c; zinc dust, N. Y., 8c.

BABBITT METAL.—San Francisco, No. 1, 10c.

ALUMINUM.—New York, No. 1, 100% pure ingots, 35c; No. 2, 90%, 30c to 35c.

SOLDER.—Half-and-half, 100-lb. lots, 18c; San Francisco, Plumbers', 18½c; 15.25c.

PHOSPHORUS.—F. o. b. New York, 50¢@60¢.

ASSAY LITHARGE.—San Francisco, 10c per lb., small lots.

PLATINUM.—San Francisco, 100-lb. lots, \$19 per oz.; New York, \$20.50 per Tr. oz.

BISMUTH.—New York, 30¢, 2.25¢; 50-lb. lots; San Francisco, \$2.50 to \$3.50 per lb.

FERRO-MANGANESE.—Pittsburg, 80% domestic, \$58.50, large lots.

TUNGSTEN.—New York, \$1.50.

FERRO-TUNGSTEN.—New York, 37%, 32c; San Francisco, 65c (60%).

POWDER.—F. o. b. San Francisco: No. 1, 70% nitro-glycerine, per lb., in 100-lb. lots, 15½c; less than one ton, 17½c. No. 1½, 60%, carload lots, 13½c; less than one ton, 15½c. No. 1** 60%, carload lots, 11½c; less than one ton, 13½c. No. 2, 40%, carload lots, 10c; less than one ton, 12c. No. 2½, 35%, carload lots, 9½c; less than one ton, 11½c. No. 2** 30% carload lots, 9½c; less than one ton, 11c. Black blasting powder in carload lots, minimum car 72½¢.

CAPS.—3x, \$5.50 per 1000; 4x, \$6.50 per 1000; 5x, \$7.50 per 1000; 6x, \$8.50 per 1000; 7x, \$9.50 per 1000; 8x, \$10.50 per 1000; 9x, \$11.50 per 1000; 10x, \$12.50 per 1000; 11x, \$13.50 per 1000; 12x, \$14.50 per 1000; 13x, \$15.50 per 1000; 14x, \$16.50 per 1000; 15x, \$17.50 per 1000; 16x, \$18.50 per 1000; 17x, \$19.50 per 1000; 18x, \$20.50 per 1000; 19x, \$21.50 per 1000; 20x, \$22.50 per 1000; 21x, \$23.50 per 1000; 22x, \$24.50 per 1000; 23x, \$25.50 per 1000; 24x, \$26.50 per 1000; 25x, \$27.50 per 1000; 26x, \$28.50 per 1000; 27x, \$29.50 per 1000; 28x, \$30.50 per 1000; 29x, \$31.50 per 1000; 30x, \$32.50 per 1000; 31x, \$33.50 per 1000; 32x, \$34.50 per 1000; 33x, \$35.50 per 1000; 34x, \$36.50 per 1000; 35x, \$37.50 per 1000; 36x, \$38.50 per 1000; 37x, \$39.50 per 1000; 38x, \$40.50 per 1000; 39x, \$41.50 per 1000; 40x, \$42.50 per 1000; 41x, \$43.50 per 1000; 42x, \$44.50 per 1000; 43x, \$45.50 per 1000; 44x, \$46.50 per 1000; 45x, \$47.50 per 1000; 46x, \$48.50 per 1000; 47x, \$49.50 per 1000; 48x, \$50.50 per 1000; 49x, \$51.50 per 1000; 50x, \$52.50 per 1000; 51x, \$53.50 per 1000; 52x, \$54.50 per 1000; 53x, \$55.50 per 1000; 54x, \$56.50 per 1000; 55x, \$57.50 per 1000; 56x, \$58.50 per 1000; 57x, \$59.50 per 1000; 58x, \$60.50 per 1000; 59x, \$61.50 per 1000; 60x, \$62.50 per 1000; 61x, \$63.50 per 1000; 62x, \$64.50 per 1000; 63x, \$65.50 per 1000; 64x, \$66.50 per 1000; 65x, \$67.50 per 1000; 66x, \$68.50 per 1000; 67x, \$69.50 per 1000; 68x, \$70.50 per 1000; 69x, \$71.50 per 1000; 70x, \$72.50 per 1000; 71x, \$73.50 per 1000; 72x, \$74.50 per 1000; 73x, \$75.50 per 1000; 74x, \$76.50 per 1000; 75x, \$77.50 per 1000; 76x, \$78.50 per 1000; 77x, \$79.50 per 1000; 78x, \$80.50 per 1000; 79x, \$81.50 per 1000; 80x, \$82.50 per 1000; 81x, \$83.50 per 1000; 82x, \$84.50 per 1000; 83x, \$85.50 per 1000; 84x, \$86.50 per 1000; 85x, \$87.50 per 1000; 86x, \$88.50 per 1000; 87x, \$89.50 per 1000; 88x, \$90.50 per 1000; 89x, \$91.50 per 1000; 90x, \$92.50 per 1000; 91x, \$93.50 per 1000; 92x, \$94.50 per 1000; 93x, \$95.50 per 1000; 94x, \$96.50 per 1000; 95x, \$97.50 per 1000; 96x, \$98.50 per 1000; 97x, \$99.50 per 1000; 98x, \$100.50 per 1000; 99x, \$101.50 per 1000; 100x, \$102.50 per 1000.

FUSE.—Triple tape, \$3.60 per 100 feet; double tape, \$3.00; single tape, \$2.40.

Hemp, \$2.10; Cement No. 2, \$3.00; Cement No. 1, \$2.65, in lots of 3000 feet and up.

CANDLES.—Granite 6s, 16 oz., 9½c per set; 14 oz., 40s., 8½c.

OILS.—Linseed, pure, boiled, bbl, 74c; cs., 79c; raw, bbl, 74c; cs., 78c. Deodorized Stove Gasoline, bulk, 14½c; cs., 20c; 86° Gasoline, bulk, 20c; cs., 26c; 63° Naphtha or Benzine, deodorized, in bulk, per gal., 13½c; do., in cs., 14c.

Lard Oil, Extra Winter Strained, bbl, 75c; cs., 80c; No. 1 bbl., 50c; cs., 55c.

Neatsfoot Oil, cooper's' bbls., 60 cs., 65c; No. 1 bbl., 50¢@52½c; cs., 55¢@57½c.

CHEMICALS.—Cyanide of potassium, 98%—99%, jobbing, 31½¢@32½c per lb.; carload, 29¢@30c; in 10-lb. tins, 40c; sulphuric acid, in carboys, 66¢ B, 2c per lb.; soda ash, 100 lbs., 100 lbs.; hyposulphite of soda, 100 lbs.; blue vitriol, 5½¢@6½c per lb.; concentrated, 7¢@8c per lb.; chlorate of potash, 12¢@13c; roll sulphur, 6c; ammonium sulphate, 11¢@12c; flour sulphur, French 24¢@25c; California refined, 1¢@2c; trisulphur, in carboys, 8c per lb.; caustic soda, drums, 3¢@4c per lb.; Cal. s. soda, bbls., 100 lbs., 95c per 100 lbs.; chloride of lime pot., 22.50¢@26.00; nitrate of potash, in ke 80c.

caustic potash, 10c in 40-lb. tins.

ALPHABETICAL INDEX TO ADVERTISERS.

(-) Indicates every other week or monthly advertisements.

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| 2 | "Mining Investor" | | | | |
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| 14 | Richards, J. W. | | | | |
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| 9 | Rix Compressed Air & Drill Co. | | | | |
| 5 | Robins Conveying Belt Co. | | | | |
| 21 | Roebling's Sons Co., John A. | | | | |
| 15 | Roesler & Hasselacher Chemist. | | | | |
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| 18 | Santa Fe Railroad. | | | | |
| 19 | Schaw, Ingram, Batcher & Co. | | | | |
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| 14 | Simonds, Ernest H. | | | | |
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| 17 | Smith Co., S. Morgan. | | | | |
| 17 | Smith & Co., Francis. | | | | |
| 14 | Smith & Thompson. | | | | |
| 2 | Smooth-On Mfg. Co. | | | | |
| 2 | Standard Oil Co. | | | | |
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| 14 | Stevens, Ralph E. | | | | |
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| 2 | Yuba Con. Gold Mining Co. | | | | |

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MOHICAN MINING & MILLING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Tuolumne County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 6th day of November, 1901, an assessment (No. 2) of five cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, No. 300 California street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 4th day of January, 1902, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 3d day of February, 1902, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.
JNO W. CLASSEN, Secretary.
Office—No. 300 California street, San Francisco, California.

THE CALIFORNIA DREDGING COMPANY.—Principal place of business, 120 Sutter Street, San Francisco, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 23rd day of October, 1901, an assessment (No. 3) of \$10 per share was levied upon the capital stock of the corporation, payable immediately in gold coin, to the secretary of the corporation, at the office of the company, 120 Sutter Street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on MONDAY, the 25th day of November, 1901, will be delinquent and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 18th day of December, 1901, to pay the delinquent assessment, together with the cost of advertising and expenses of sale.

SAM. W. CHEYNEY, Secretary.
120 Sutter Street, San Francisco, California.

AMERICAN OIL AND REFINERY COMPANY.—Location of principal place of business, San Francisco, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 21st day of October, 1901, an assessment of five (5) cents per share was levied upon all the subscribed capital stock of the said corporation, payable immediately to J. C. Anthony, secretary of said corporation, at its office, at room No 323 of the Parrott building, Nos. 825 to 855 Market street, in the City and County of San Francisco, State of California.

Any stock upon which this assessment shall remain unpaid on the 25th day of November, 1901, will be delinquent and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 23rd day of December, 1901, to pay the delinquent assessment, together with costs of advertising and expenses of sale.

By order of the Board of Directors.
J. C. ANTHONY, Secretary.
Office—Room 323, Parrott building, Nos. 825 to 855 Market street, San Francisco, California.

THE THORPE MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Fourth Crossling, Calaveras County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 8th day of October, 1901, an assessment (No. 11) of one (1) cent per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 632 Sacramento street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 18th day of November, 1901, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 9th day of December, 1901, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.
A. F. FRBY, Secretary.
Office—632 Sacramento street, San Francisco, California.

YUBA CONSOLIDATED GOLD MINING COMPANY.—Local place of business, San Francisco, California; location of works, Nevada County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 12th day of October, 1901, an assessment (No. 1) of five cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin to the secretary, at the office of the company, Room 801 of the Claus Spreckels Building, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 18th day of November, 1901, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 18th day of December, 1901, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.
EDWARD H. STEARNS, Secretary.
Office—Room 801, Claus Spreckels Building, San Francisco, California.

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THE CALIFORNIA DEBRIS COMMISSION. having received applications to mine by the hydraulic process from N. Gilman, in the American House Mine, at the American House, Plumas Co., to deposit tailings in a ravine below the mine; from Jas. A. Modglin, in the Old Gardiner's Point Diggings, near Fort Wine, Sierra Co., to deposit tailings in Saw Mill Ravine; from the California Company, in the North Hill Placer Mine, near Milton, Calaveras Co., to deposit tailings in Rich Gulch; and from L. V. Tefft, in the Lone Star Mine, near Cromberg, Plumas Co., to deposit tailings in Jackson Creek, gives notice that a meeting will be held at Room 59, Flood Building, San Francisco, Cal., on November 11, 1901, at 1:30 P. M.

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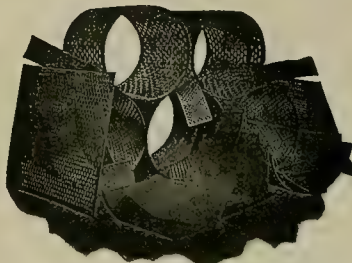
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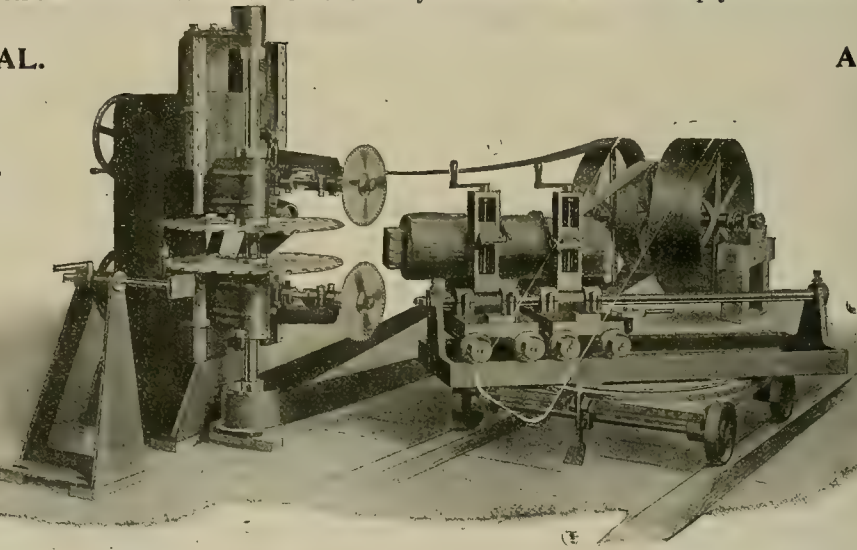
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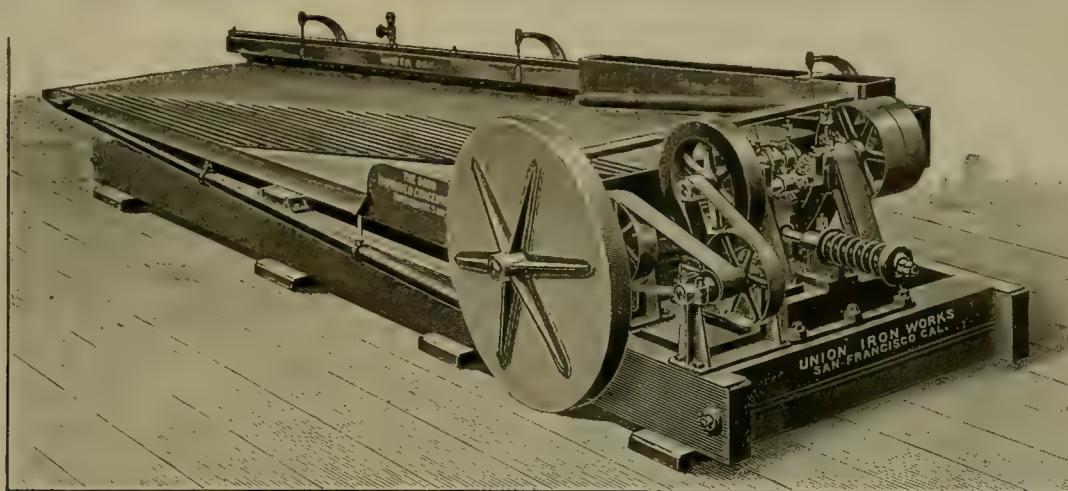
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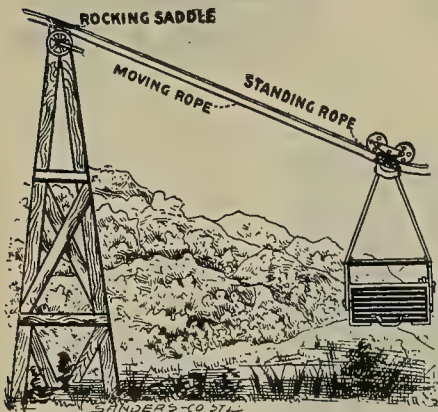
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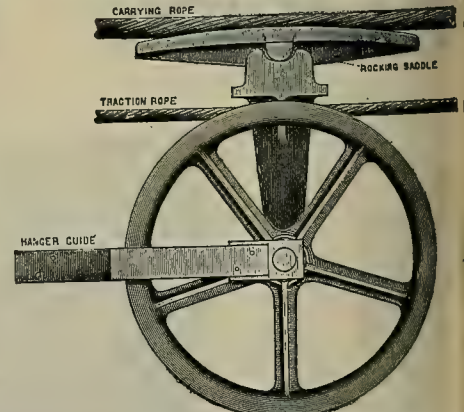
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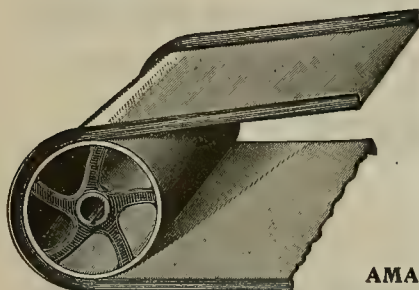
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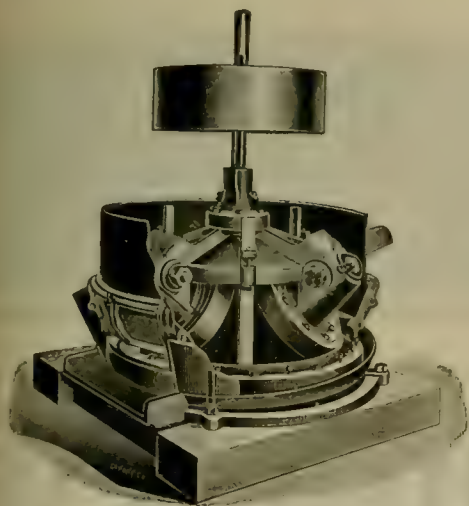
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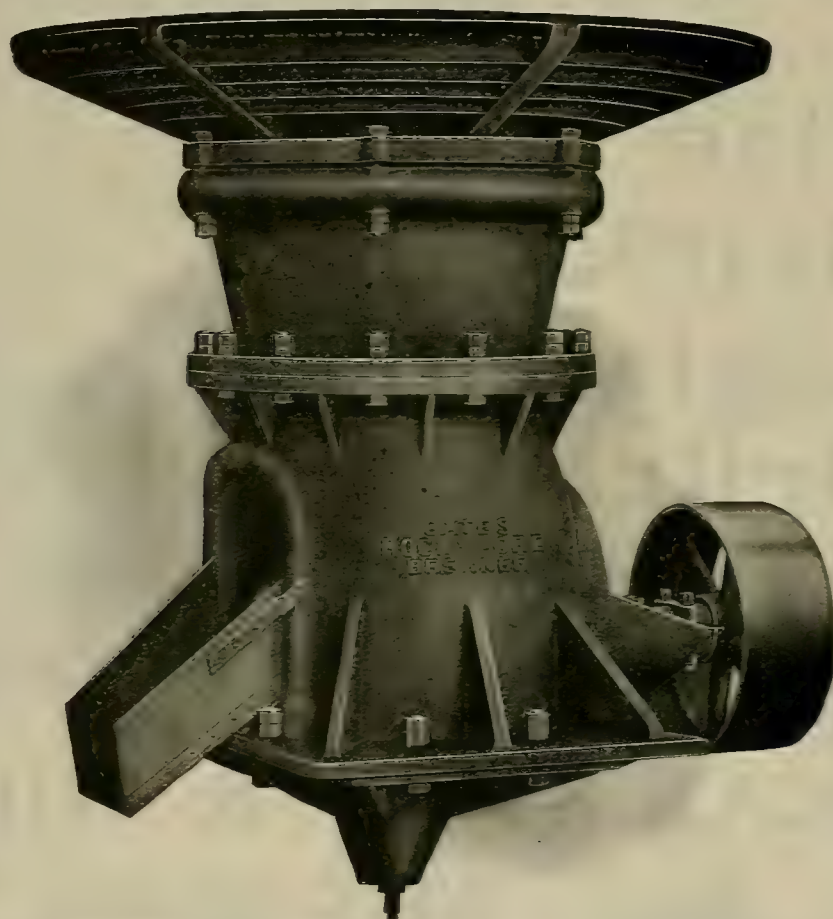
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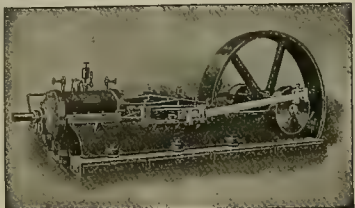
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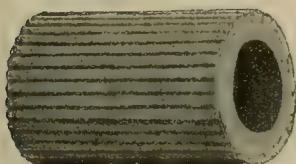
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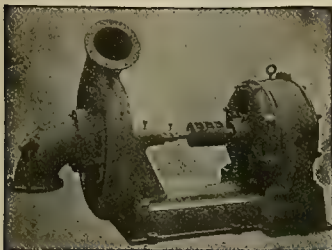
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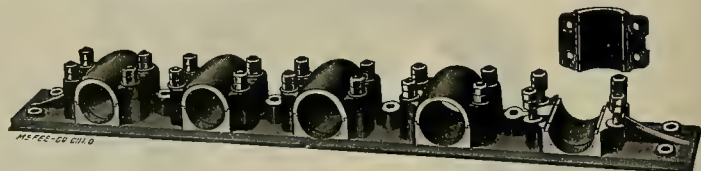
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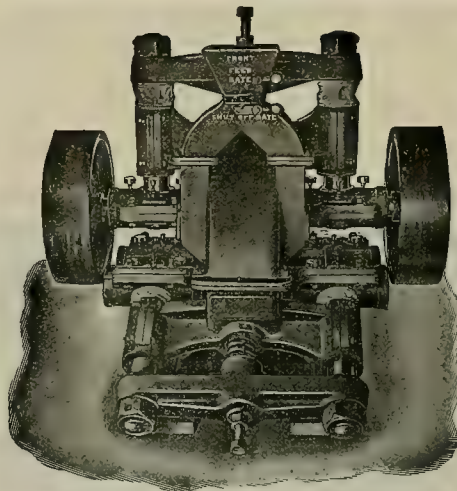
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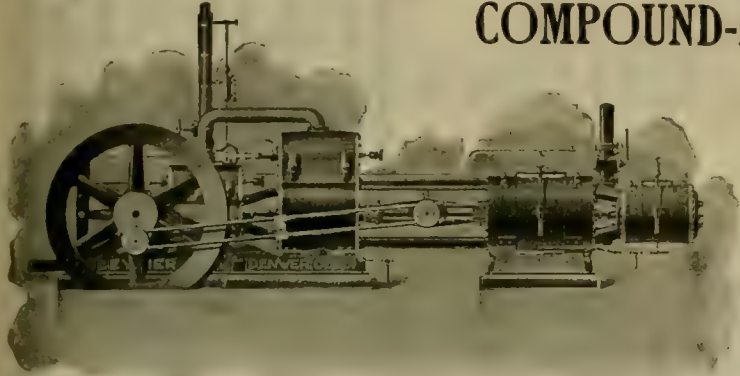
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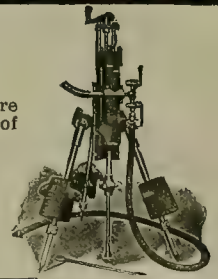
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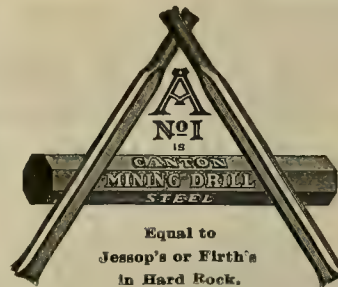
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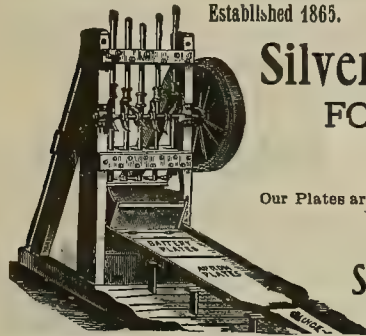
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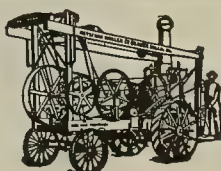
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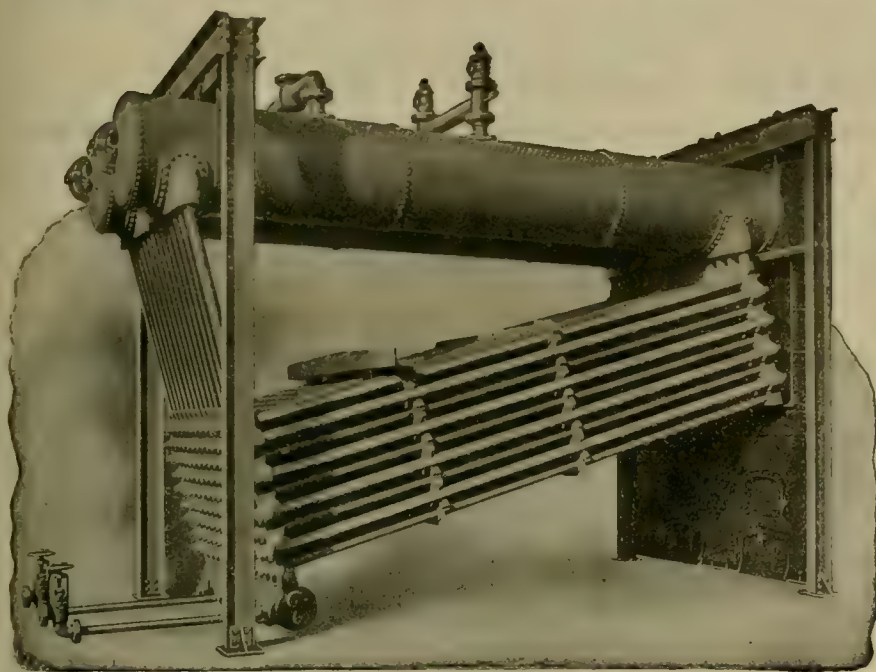


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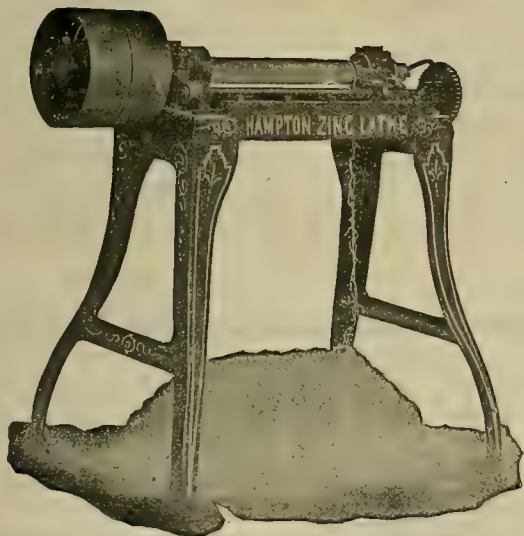
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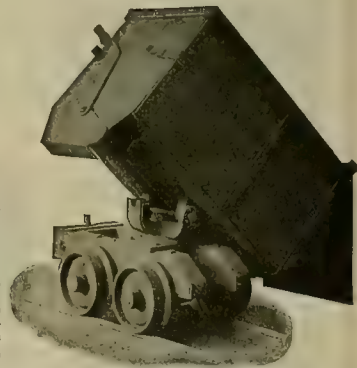
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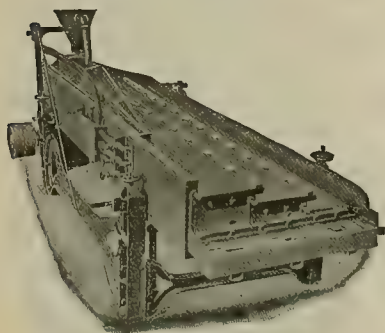
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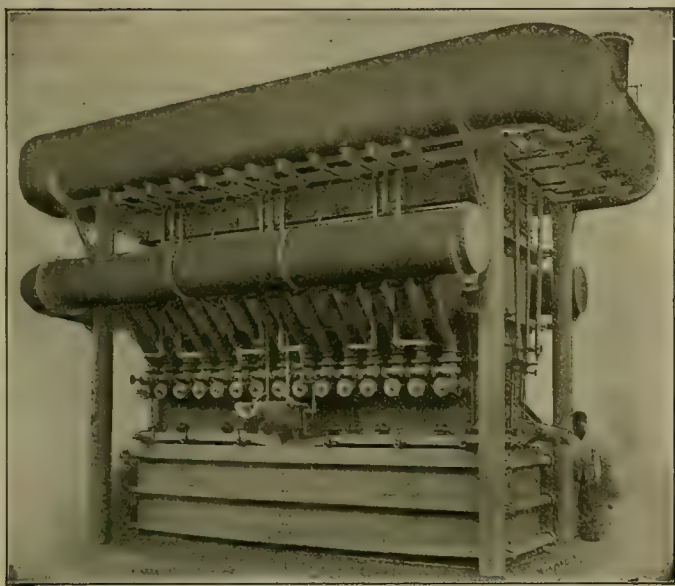
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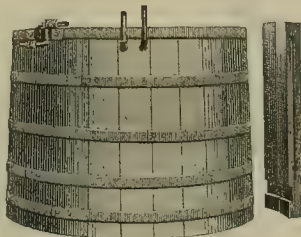
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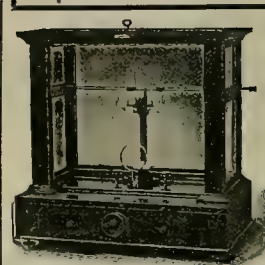
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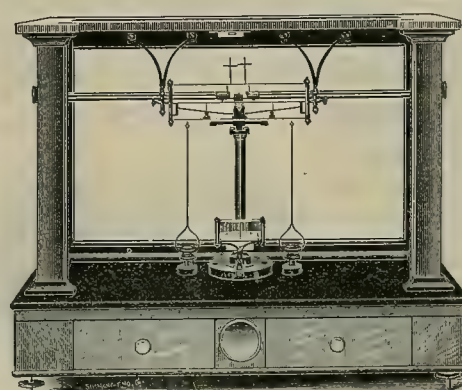


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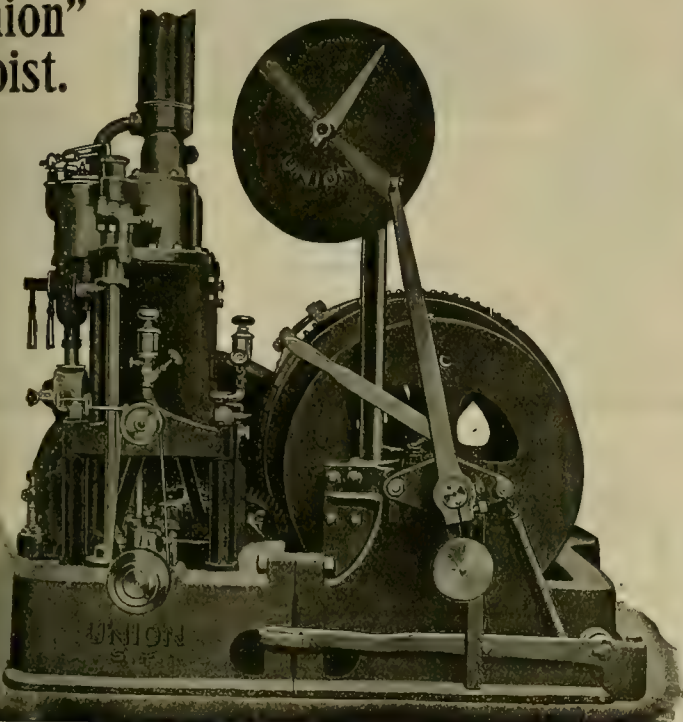
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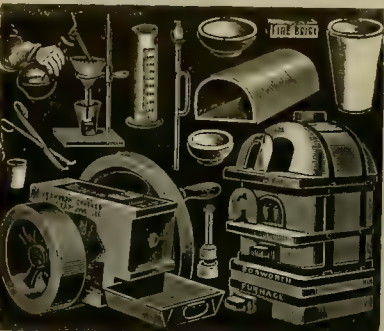
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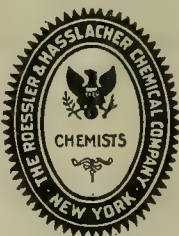
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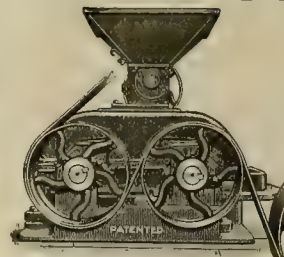
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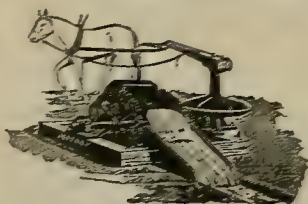


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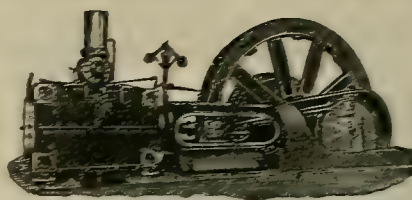
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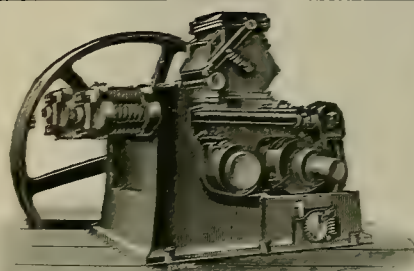
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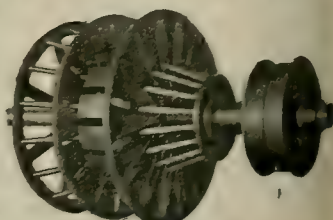
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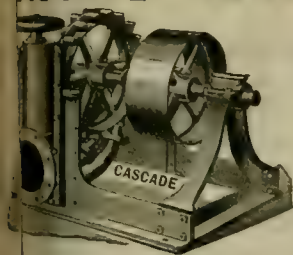
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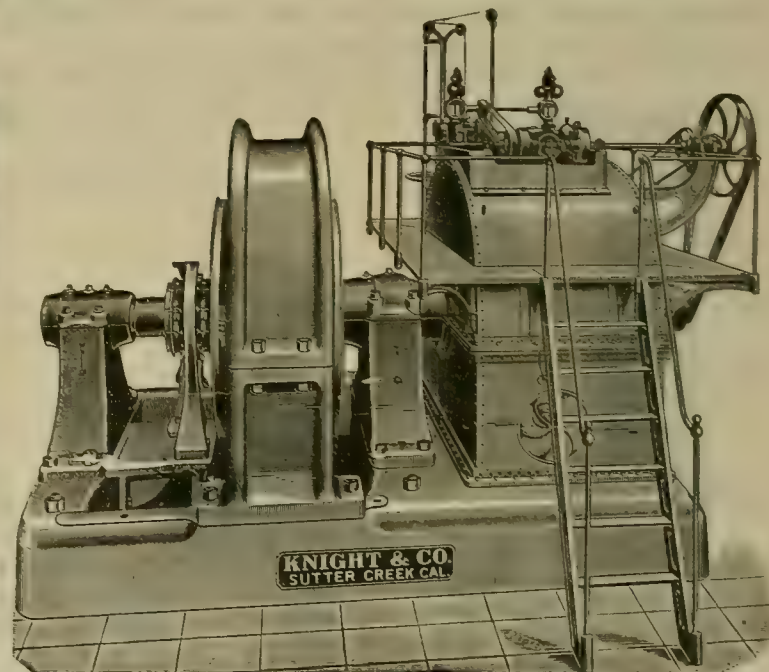


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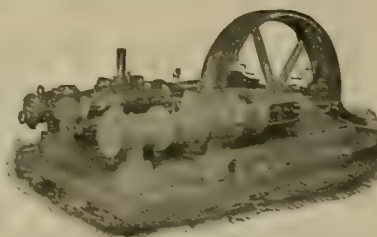
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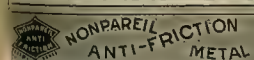
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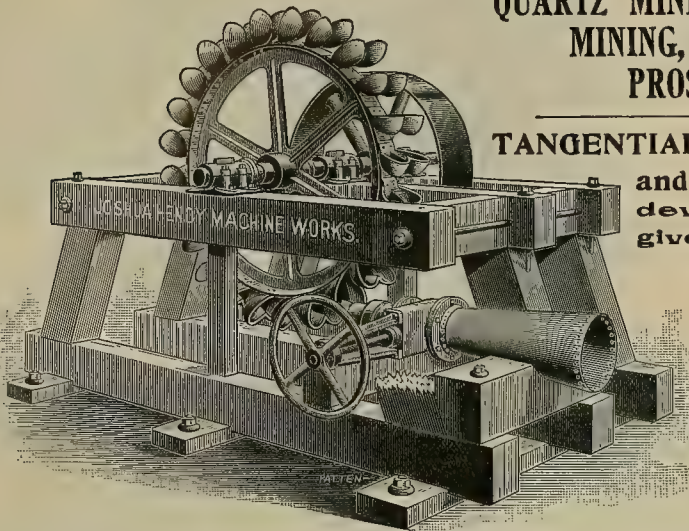
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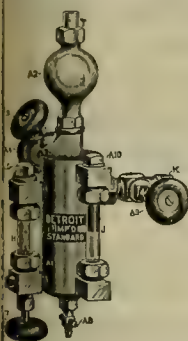
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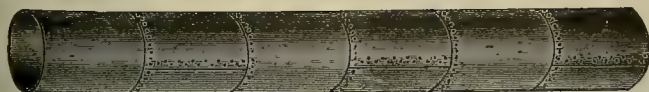
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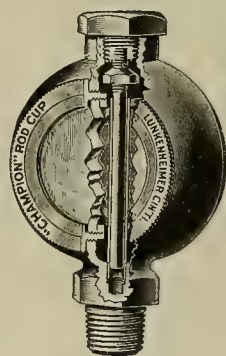
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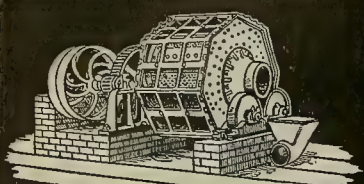
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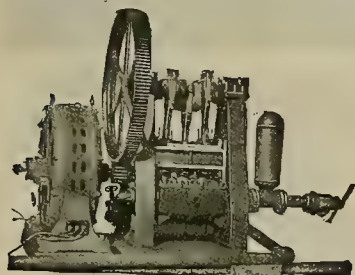
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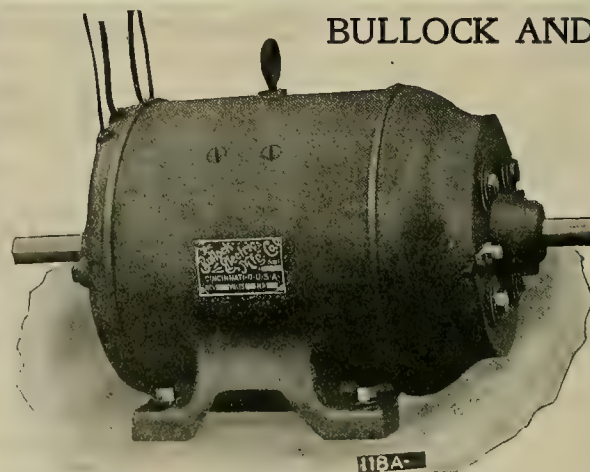
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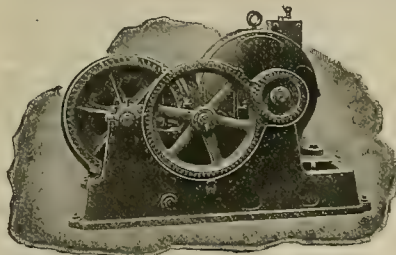
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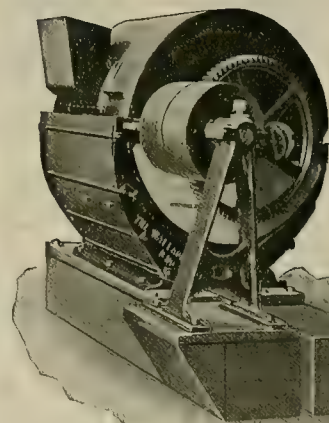
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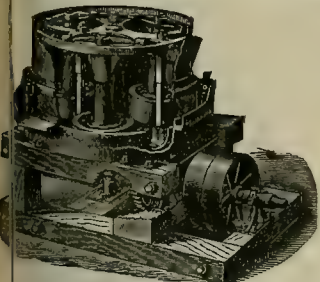
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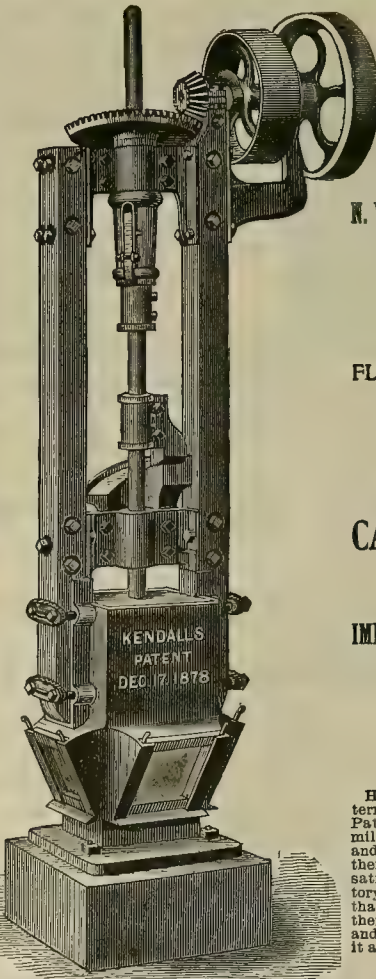
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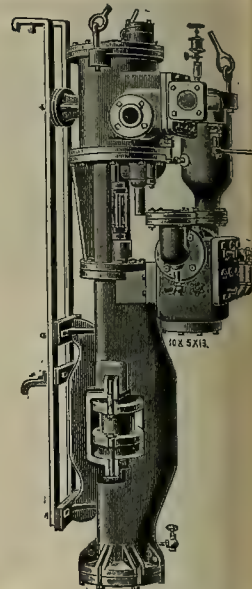
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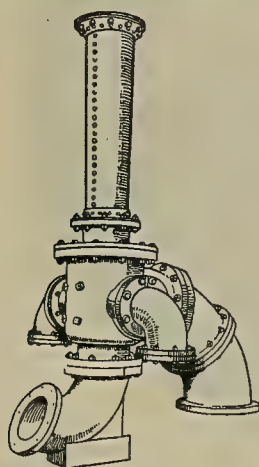
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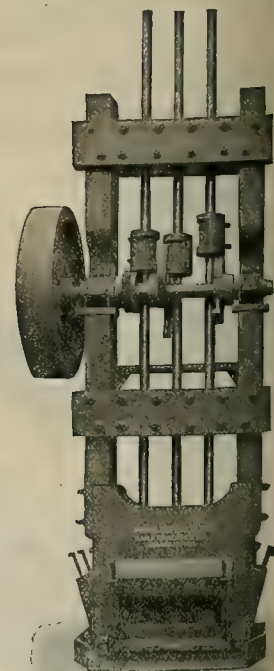
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Whole No. 2156.—VOLUME LXXXIII. Number 20. SAN FRANCISCO, SATURDAY, NOVEMBER 16, 1901. THREE DOLLARS PER ANNUM. Single Copies, Ten Cents.

Mineral Resources of Arizona.

A striking feature of the general interest attracted to mining during the last half dozen years has been the renaissance of Arizona mines. A widely extended and profitable mining industry has been developed from a supposedly decadent industry. The criticism of unsuccessful miners who did not dig down, that Arizona mines had no depth, has been disproved by the now successful miners who have dug mines down to great depths. At the same time Arizona mines have been found to have great breadth as well as depth. The mines are notable for the enormous ore bodies that extended working has disclosed.

The great change in Arizona mines from what they were a dozen years since to what they are now can be attributed principally to the increased value of copper and to the improvements in modern metallurgical methods. The increased value of copper made ores, formerly unavailable, commercially desirable. Improved metallurgy cheapened the cost of their treatment and increased the margin of possible profit.

Old mines—the great silver and gold producers of twenty and thirty years ago—have been reopened to work greater depths, and to secure the copper-bearing ores that were then left in the mine as too base or too low grade to justify mining and treatment for the gold and silver they carried. Now these ores are the basis of a greater mining industry than their appearance was supposed to have destroyed.

The physical conditions make Arizona mineral de-

advantage over most copper mines in other districts. Also, as the sulphide ores are reached with depth, they are found to average high in copper and to carry, as a rule, exceedingly high values in gold and silver, notably the former.

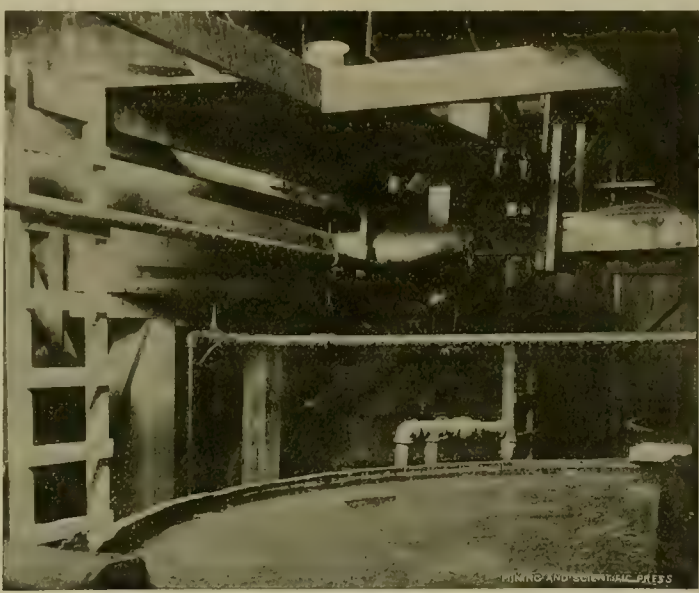
Much of the mining work going on in Arizona dur-

same kind of a record of free-milling exploitation of upper levels and abandonment by reason of the incoming of water with depth or the exhaustion of the first bonanza ore body.

It used to be said, once a silver mine always a silver mine. Now the experience accumulated in Arizona and other Western mines, which for a time was supposed to disprove it, has confirmed and rather improved it. The once silver mines are not only still silver mines, but they are copper mines and gold mines as well.

The new Arizona mining is different from the old, which had considerable of the effect of Mexican association in its methods. The mines were worked near the surface and for high-grade ores only. When the high-grade ore deposit was exhausted, the mining stopped. The new Arizona mining is availing itself of the methods that have proved effective in other regions. Deep shafts are being sunk and the best types of hoisting and pumping machinery are being installed. Milling and smelting plants are being built to save all the different values the complex ores contain. Mining is being made a business of manufacturing rather than an opportunity for gambling. It cannot help being made a profitable business. Copper can be manufactured very cheaply in Arizona. So, too, can lead.

The years of preparation, of getting ready to commercially exploit Arizona mineral resources, are well toward their end. The figures of annual production of copper, gold and silver for the Territory can now be expected to increase rapidly



Portland M. Co., Central City, South Dakota; View Inside Mill. (See page 202.)

ing the last two years consists in the opening of great metal-bearing deposits and in their equipment with metallurgical plants. In nearly every county of the Territory new mines have been opened, developed and equipped without the aggregate of this work at-



Portland M. Co. Mill, Outside Solution Tanks: (See page 202.)



Portland M. Co. Cyanide Mill, Central City, South Dakota. (See page 202.)

posits part of the system developed even more extensively in northwestern Mexico. Copper is the principal metal. The original sulphide minerals have been largely oxidized and secondary deposition has concentrated the values in large, easily minable deposits. In this development of the oxide and carbonate ores, Arizona mines have had a considerable

tracting attention. In nearly every county in the Territory a large proportion of the old mines are being reopened. This is true not only of the old mines that were worked as free-milling gold and silver propositions down to the zone of copper-bearing sulphides and then abandoned, but is equally true of the great silver mines, which have had the

toward a very much higher level than they have ever reached before.

Another feature of Arizona's mineral resources that the last few years has made prominent is the increasing area of the Territory that is being found productive. From a few camps development has spread out till it includes nearly the entire Territory.

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San Francisco, November 16, 1901.

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Three Counties of California.

Trinity county, and, it may be added, two other northwestern California counties, have during the last half dozen years or so provided a number of mining surprises. Iron mountain, in Shasta county, which had been so repeatedly a commercial failure that its title, the Lost Confidence mine, seemed to reverse the usual fortune of mining names by proving itself no misnomer, was the first surprise. Long before the coming of 17-cent copper it became a striking commercial success in so large a way, that its former failures in a small way ceased to condemn the country, and became looked on as the misfortune of the old miners, who, it has since been erroneously assumed, did not know how to mine, rather than that there was a deficiency of value in the mine. This has been followed, since the copper price climbed to 17 cents a pound, by the revival of Copper City, as it was once known, under new names, Bully Hill and later Delamar, and, by the discovery that in the immediate vicinity in Shasta county there were many other copper-bearing deposits of enormous extent that only required the same complete, persistent development to become commercially the equals of the two specially referred to.

Siskiyou county, which to the uninformed had joined the long procession of mining districts whose mining had only historical and not commercial interest, has, like Shasta county, contributed surprises. West of Gazelle, in hills that long since had been supposed only a cattle or sheep range, a district of large and rich copper and gold-bearing ledges has been discovered and developed well along toward the largely productive stage. Henley, an early day mining camp where the miners had nearly all turned farmers by reason of the placers being supposed worked out, provides a surprise in a quartz mine that within the last three years has yielded more than half a million dollars. The Siskiyou mountains, in a wild region that is so untrodden that it is the last natural wild game preserve in California, is now making its first surprise in the development of enormous copper-bearing deposits. This is likely not to be its last surprise. It is both possible and probable that the closer investigation it will now get will develop valuable mines of gold, quicksilver and platinum. There are many geological reasons for assuming the source of the latter metal found in the Klamath river gravels to be in the Siskiyou mountains north of that stream rather than in the region south of it.

Trinity county, of the three in the northwest, has been the most spectacular in its late mining surprise

offerings. Soon after the announcements of the Klondike discoveries in 1897, it came forward with a very large nugget of gold from a quartz lode. It has not since repeated this; but as a result of the confidence developed, there are now operating half a dozen profitable quartz mines in the Carrville country—the region of the great find. This year the first surprise is almost the last that could be anticipated—the discovery of a great placer deposit—the Sweepstake property, now receiving the largest and most costly installation of placer mining plant made for many years past in California. Another mining surprise of this year from Trinity county is in the late reports of discoveries from the New River country, in the northwest corner of the county. First it was of copper, and last of large quartz lodes of more than ordinary richness in gold. New River is not new as the scene of spectacular mining discoveries that inspire the efforts of prospectors. Twenty years ago nearly similar reports came from this distant, and quite inaccessible region, of gold-bearing ledges of extraordinary richness, but the interest in them rapidly died out till they were forgotten, to be recalled now that the same reports come out as new.

Shasta county and, to a lesser degree, Siskiyou county have presented their mining surprises as a result of changes in commercial conditions which have made known mineral resources for the first time available. Trinity county and, in the main, Siskiyou county are making their unexpected showing now simply because the early-day prospecting was incomplete. It has been taken for granted that the early-day miners and prospectors overlooked nothing. The fact is that there was comparatively little prospecting and exploration done in early days in much of this country, and what was done was extremely superficial. The region of many of the late surprising finds is remote and extremely difficult. The few inhabitants long since ceased to look for anything new in mines, and in time have come to believe there could be nothing new. New-comers for the last twenty years have been few and have quite generally retreated before the great difficulties attendant on original work, coupled with the prevalent belief that ultimate failure waited on the end of any effort to make discoveries.

Happily, the discoveries have come at a time to instill the confidence of reward before which physical difficulties vanish like a morning mist before the uprising of a California sun. There is no reason why the New River country, in Trinity county, and the Siskiyou mountains, in Siskiyou county, should not become rich and populous mining centers. Well-defined and well-proved mineral belts traverse both regions. The Hay Fork country in Trinity county, too, promises well. It must be remembered that what is found now, is only found now, because it was never thoroughly searched for in the old mining days. A prospector in these California localities is really in almost as completely untried ground as any region of Alaska or British Columbia, and in a country that has been less prospected over than Arizona or Nevada.

This journal has frequently called attention to the dormant mining possibilities of this section and suggested that it would reward the investigation of prospectors and operators. The magnitude of these possibilities is clearly shown in the last semi-annual report of the Mountain Copper Co., which shows that during the six months there were smelted 172,782 tons of ore, which yielded an average of ninety-four pounds of copper to the ton, netting an average profit of 6 cents a pound, or \$1,458,000 profit for six months. This rate of production puts it in output ahead of the Quincy mine, the second in production in the Lake Superior region.

THE figures given on another page in a paper by William H. Radford, showing cost details of a hydraulic mining exploitation in California, are interesting. The low figure of total cost, 2.198 cents per cubic yard for material moved, is, if not the lowest ever made, certainly close to it. It is particularly remarkable in connection with the low figure of duty to the inch of water, 1.91 cubic yards. With higher banks, ordinary duty for water on similar free wash gravel would be from 2.76 cubic yards to 3.2 cubic yards. While the figures are actual, and not estimates, they cannot be safely taken as a standard for estimating the costs

of other projected hydraulic mining. The costs of water supply and of breaking up rocks and clay in nearly all operations are higher than these figures.

Economies in Power Costs.

The conservation of the water power of the mountain streams in California and Colorado, and its electrical transmission to mines and milling plants and to industrial centers, has been notably extended and complete. Both States are now inaugurating the conservation of the fuel energy of coal in a convenient central station for distribution electrically to mines and mills exactly as if it was water power that was being so utilized. In the Colorado instance it is the already complete utilization of the available water power that, coupled with the economy that can be effected in saving transportation of coal from the coal fields to the more or less distant and inaccessible mining plants, is the business motive for the new enterprise. In the California instance it is more particularly the cost and difficulty involved in getting a proper water supply to the mining plants. They are in the Randsburg district in Kern county, in a nearly rainless region. In Colorado the metal mine owners are reported to be planning to buy a tract of coal-bearing land, and so conduct the business that they shall get power at flat cost. In California the owners of the coal mines are engaging in the business to make an additional profit from their coal mines. In both cases the profit gains are made by the elimination of a middleman, and a middle service—transportation.

These two widely separated effects from a similar cause—the existence of a large reducible transportation item of the costs of mining—are a practical commercial demonstration of the principle this journal suggested in its issue of June 1st of this year to the California petroleum producers, whose business it was claimed was being made unprofitable by high railroad freight charges. It was pointed out that what the consumers of fuel wanted was the light, heat or power, that was manufactured from the raw material—fuel. It was not essential that each consumer should manufacture light, heat or power for his own service. It was just as practicable, more convenient, and inevitably less costly to buy them ready made from the producer of the petroleum. It was suggested that it was cheaper to transport light, heat and power by wire than to transport petroleum by rail or by pipe line. Practical demonstration of the conclusive character of this suggestion has not only been made by the two commercial enterprises instanced above, but the limit of distance of electric power transmission has been raised, and its cost of transmission lowered since June of this year. The Bay Counties Power Co. are commercially utilizing power 220 miles from the generating station, and a practical commercial test has been made of transmission at 80,000 volts pressure as compared with 40,000 volts, then regarded as the extreme limit. This doubles the duty and earning power of the investment in copper wire used in transmission lines.

The feature in these practical developments that should fix the attention of petroleum producers, and coal producers as well, is the reduction of the reducible item—transportation—to its economic minimum, and its possible practical elimination as a cost item determining sale price. It must surely be realized that no combination of producers of raw material—of petroleum—is commercially invulnerable against new and cheaper fields of production. The opening of one petroleum well close to tide water at San Francisco bay will take away much of the present value of petroleum production elsewhere in California where that production must be transported to market as raw material. The difference of transportation cost will give the market to the nearest field. But, if the raw material is first manufactured into light, heat and power before going to market, there is then no determining difference arising from difference of transportation to give the market to the nearest field of production. The sole cost difference at the market is current interest only on the difference in the respective sums invested in transmission lines. This difference as compared with the sum of the costs, due to investments and charges that are the same in all the fields, is so small that it cannot determine control of the market.

Concentrates.

THERE is no market in San Francisco for tungsten ore.

FOUR-DECK CAGES, holding four mine cars, are used in many of the large mines at Butte, Mont.

ZINC AMALGAM is made by pouring mercury into melted zinc. It should be kept under water.

A TRIAL COURT in Baltimore, Md., has ruled that a seat in a stock exchange is not taxable though it is property.

THE cubic contents of an ore body in feet, divided by 11 if sulphides, and by 15 if oxidized, would give the tonnage, approximately.

FOR the weight per lineal foot of square and flat bars, multiply the area in square inches by $3\frac{1}{2}$ for cast iron, $3\frac{1}{2}$ for wrought iron and $3\frac{1}{2}$ for steel.

THE basis of the settlement of the machinists' strike in San Francisco is that they return to work per day of nine hours, with nine hours' pay therefor.

THE best pressed brick and firebrick weigh 150 pounds to the cubic foot, common hard brick 125 pounds to the cubic foot and soft brick 100 pounds to the cubic foot.

ANNUAL ASSESSMENT WORK questions are matters for determination by the courts, not by the Land Department at Washington. This is the latest ruling of the latter.

NICKEL, cobalt and manganese are magnetic but in a much less degree than iron. A number of minerals are also more or less magnetic in which the metal by itself is not magnetic.

FOR weight per lineal foot of round steel bars take the diameter in quarter inches, square it and divide by 6. Or take the diameter in eighth inches, square it and divide by 24.

ALL of the large ferry steamers on San Francisco bay, Cal., are changing from coal to petroleum fuel, permission having been granted by the U. S. Steamboat Inspection officials.

MAGNETIC SEPARATION, combined with jigging, has been found by experiment to concentrate chrome iron ores so as to bring them above the 50% limit which makes them marketable.

It is ordinarily found to be the case that a more rapid and cheaper construction of a tunnel or drift can be made in soft rock that requires timbering than in hard rock that holds up without it.

THE breaking lode of an aluminum wire, .126 inch in diameter, which has a tensile strength of 28,200 pounds to the square inch and an elastic limit of 19,376 pounds to the square inch, is 2790 pounds.

THE rehearing of the complaint of the Kern, Cal., petroleum producers against the railroad transportation has been postponed to December 21, 1901. Meanwhile the rate complained against remains in force.

THE New Zealand Minister of Mines states that his Government offers a bonus of £2000 for the introduction of a machine or appliance which will satisfactorily treat auriferous blacksand deposits on a large scale.

THE combined by-products of coke making have, in their primary state, a value of about \$1 for every ton of coal coked. Ultimately converted by chemical processes, these products have a very much greater value.

THERE is no fixed limit yet determined as the maximum pressure head that it is practicable to use with a tangential water wheel. An installation with 1700 feet head has been made and one of 1900 feet is under serious consideration.

THE copper produced by the Utah Con. Co at Bingham is claimed to cost 3 cents a pound, after crediting the gold and silver produced with it against the costs. Without this credit it is claimed the copper costs 7 cents a pound to produce.

NAPIER'S law of the flow of steam through an orifice from a higher to a lower pressure is proportional to the absolute steam pressure until the pressure against which the flow takes place equals or exceeds .6 of that in the vessel under pressure.

THE effect of the association of magnetite and chalcopryrite in ore bodies requires exploration in depth to determine questions of magnitude and permanence. No such deposits have yet been mined more than superficially on the Pacific coast.

THE cost of smelting copper ores to matte at the Granby smelter at Phoenix, B. C., according to the statement of the president of the company, has been reduced to \$1.90 a ton and it is anticipated that the cost can still further be reduced.

A FLUME 6 feet wide and 5 feet high should be built of 1½-inch plank and 4x6 scantlings, 6x8 or 6x10 lumber for sills. A 16-foot box of such a flume would require to construct it between 760 and 800 feet of lumber, being 47½ to 50 feet to the lineal foot of flume.

ARAGONITE is calcium carbonate distinguished from the exceedingly common form known as calcite by its higher specific gravity and absence of rhombohedral cleavage. It is a deposit from some mineral springs, and in limestone caves form stalactites.

THE copper ore mined and reduced at Ducktown, Tenn., is claimed to average forty-five pounds of copper to the ton. It is stated that at the present price of cop-

per a production of twenty-five pounds to the ton of ore covers all the expenses of production. This would be about \$4.10 to the ton as costs of mining, roasting, smelting and converting.

THE amount of water required for a gold stamp mill varies from five to fifteen tons per ton of ore crushed, according to the character of the ore, style of mortar and concentration used, etc. The boiler would need about 7½ gallons per horse-power hour.

THE locator of a mining claim located any time this year has until Dec. 31, 1902, to do the \$100 worth of assessment work required to hold it. On unpatented mining claims located prior to Jan. 1, 1901, there remain but forty-five days in which the requisite work must be done.

AT Atlin, B. C., placer miners taking out coarse gold that was bright and angular traced it to its source in a quartz lode by deep trenching, cutting down through the more or less disintegrated surface of the bedrock into rock in place. The lode is now being mined and milled with profit.

WHERE an individual or company takes possession of a claim, holds it and works for five years, as good a title is thus obtained as though a formal location of the property had been made. The Supreme Court of California so decided in the case of the Altona Q. M. Co. vs. the Integral Q. M. Co.

PROVED oil-bearing land at Beaumont, Texas, is held at \$100,000 an acre. There are 200 acres of proved land in Spindletop hill, making the market valuation of the Beaumont field \$20,000,000. It is reported that a prospective buyer was asked \$4000 for a 20x50-foot lot, or at the rate of \$175,000 an acre.

HYDROGEN PEROXIDE is the antidote for cyanide poisoning. A 2.5% solution is used in hypodermic injections made in different parts of the body every four minutes. At the same time the stomach is washed with a 2% solution of the peroxide, which forms with hydrocyanic acid the oxamide $2CO NH_2$, which is harmless.

A MINING CLAIM located on Jan. 1, 1901, does not require assessment work in the year 1901. Assessment work must be done in 1902. The claim, unless assessment work is done in 1902, becomes forfeit and is locatable again on Jan. 1, 1903, but not before then. Assessment work done in 1901 does not save doing it in 1902. It must be done in 1902 for that year.

IN the Rand mines, Transvaal, owing to the scarcity of labor, it has been found economical to use machine drills to break the ore in stopes and to afterwards sort out the barren waste broken out with it. This waste has amounted to as much as 40% in some of the mines. It is considered cheaper to sort the waste out by hand than to put it through the mills.

A SUSPENDED CABLE ore transportation line will operate automatically with a net fall of 400 feet to the mile in the line. With less fall, auxiliary power must be employed to operate the line. With more fall, power for other purposes can be had. Provision to utilize this developed power depends on the commercial feature—there must be enough extra power to pay.

COMPRESSED AIR wasted from power drills is so contaminated with oil from the cylinder that it cannot be taken into consideration as ventilation. It is as important to displace it with pure air as it is to drive out or draw off other vitiated air. The ventilation should be an independent supply provided by fan or blower, delivering by pipe at the point where miners are working.

THE Cripple Creek, Colo., drain tunnel, now in 2800 feet, 9x9 feet in dimensions, is costing somewhat less than \$30 a foot. The Baker Divide tunnel, near Forest Hill, Cal., 3300 feet long, 10 feet wide by 8 feet high, cost \$14 per foot. The Red Point drift mine tunnel, at Damascus, Cal., 2400 feet long, 8 feet wide by 7 feet high, cost \$19 a foot. The Gray Eagle tunnel, near Auburn, Cal., 2700 feet long, 9 feet wide by 7 feet high, cost \$11.50 a foot.

THE U. S. Revised Statutes provides a method by which a U. S. patent can be obtained to the small fractions of public land left between mining claims, provided the fractions are not mineral, do not contain lodes or placers. The General Land Office will order the sale of these lands at public auction on request being made to it, accompanied with a deposit of the minimum amount that would be payment for the land at the minimum price of \$1.25 an acre.

FOR a stamp mill, free-milling treatment, 70 feet elevation between the concentrator and mine-car dump floors provides sufficient fall for the movement of the ore through the several appliances to be effected by gravity. As low a difference as 40 feet can be made to answer every purpose. In some cyanide and concentration mills the difference in level runs up to 200 feet. At the Golden Gate mine cyanide works at Mercur, Utah, the difference in elevation is 145 feet.

WORK to the amount of \$100 performed in placer mining on a lode claim by a lessor is annual assessment work on the claim. But the reverse case would seem different. Work to the extent of \$100 in amount done on a lode inside the boundaries of a placer claim, it would seem, could not be considered assessment work on the placer. The lode within the placer, provided it is known at the date of the placer location, is not held by virtue of that location, but must be separately located as a lode. The work without location, according to law, would not protect the lode against location by a second party. If

the lode is located in a lode claim, the work done on it applies to the lode claim alone as assessment work. The placer claim must have work done on it to the extent of \$100. The difference would seem to be in the difference of the grant made by the law. In a lode claim all the mining deposits, without reservation, within the exterior boundaries, are granted by the law. In a placer location only the placer deposit is granted, known lodes are reserved.

TO GET a power development from a water flow in a pipe, a large part of the full capacity of the pipe to conduct water is lost. The supply pipe water velocity should preferably be kept low, so that the jet flow used gets the velocity of the largest possible portion of the total head. If the pipe is delivering its full flow—all it can carry—there is no power development possible; all of the power in the head is used to move the water against the pipe friction.

NEARNESS to a proved mine is not a guarantee of the value of a prospect. The mere presence of similar ledge matter in the known mine and the prospect, does not create a presumption of the existence of the same ore values. While there is reason to anticipate that knowledge of the laws of formation of ore bodies will ultimately become so perfect that it can be used to locate ore bodies in advance of their development by mining with some considerable degree of accuracy, no such knowledge is yet in existence.

IN the suit of the Central Eureka M. Co. vs. the East Central Eureka M. Co. at Jackson, Cal., the court decided in favor of plaintiff and confirmed plaintiff's possession, stating that the law is well settled that a patent for a mining claim relates back to the location and is a consummation of the purchase then made. The patent being but confirmatory of the title by location, the patentee obtains the same right under it that he would have obtained if the patent had issued immediately after the location in compliance with the terms of the statute.

A BLANKET LEDGE or vein is, as used in California, a vein or ledge lying somewhere near a true level. The term is, however, used more to express a comparison with the ordinary ledges which have a dip or pitch rather than to describe a class of ledges. The apex line of a blanket ledge is the line of its highest edge. A location on that edge would give the location extralateral rights to follow the dip, be it ever so slight. If perfectly flat, the line of outcrop cut would be the apex line, and location on it would take extralateral rights in the opposite direction.

THE General Land Office at Washington has ruled in a recent case coming before it that the entry of a mineral application for United States patent must be made within the calendar year next succeeding the calendar year in which the period of sixty days' publication of the notice of application was completed. This ruling takes the place of the rule that entry must be made within a reasonable time after the publication is complete. The old rule enabled a claimant to complete his application several years after publication, but has developed abuses that the new rule, substituting a definite limit, will do away with.

THE loss of gold in the final tailings from a free-milling plant, with concentrating tables and either cyanide or chlorination treatment, is not a fixed value. It varies with different ores and with different localities and cost of facilities. The effort to recover values stops short in every case at the point where the recovered value becomes equal to the cost of getting it. There are instances where it is less than 20 cents a ton, and claims have been made as low as 8 cents a ton, and again losses are recorded as unavoidable that are as high as \$1.50 a ton. Anything over 50 cents a ton should be made the subject of a thorough questioning analysis before it is accepted as the acme of good milling practice.

QUARTZ BOULDERS and pebbles found in placer gravels are frequently remarked on as carrying no quartz gold. The condition is not universal, for placers are known in which the quartz boulders and pebbles do contain gold. The barren character of such float quartz is far the more common, however, and has been the foundation of many theories of formation of the gold found in the placers which excluded the idea of its coming originally from the quartz. The explanation of the seeming contradiction is simple. The gold in quartz is originally associated with pyrite and other sulphides. Surface percolating waters oxidize these sulphides and largely remove them, before the quartz, still containing the gold, by erosion of its overburden is itself in turn eroded and becomes placer. The quartz breaks up on its lines of least resistance, which are the lines where sulphides have been removed. The larger part of its original gold content is thus freed and the separated quartz fragments are barren. In addition to the structural weakness of the quartz containing gold, its higher specific gravity constantly increasing as the fragment becomes smaller by abrasion, by retarding its down-stream movement relative to quartz containing no gold, keeps it for a longer period of time under abrading influences. There are as well many quartz ledges that are barren of gold, and those ledges that do contain gold have barren portions. Such barren quartz, called "bull quartz" by the miners, is more resistant to disintegration than the gold-bearing quartz. It may thus happen that the quartz found in the gravels with the gold is not the quartz from which the gold was derived.

A Direct Wet Crushing Cyanide Mill of the Black Hills.*

Written for the MINING AND SCIENTIFIC PRESS by
EVERETT B. SAWYER.

In August, 1900, the Portland Mining Co., under the management of N. W. Chapman, obtained control of a nearly new, first-class 20-stamp mill at Central City, S. D. A "cyanide annex" was started so as to use the stamps for crushing in cyanide solution.

In September I accepted the position as chemist in charge of the mill and finished the construction. We started up in November, built an addition early last spring, and have operated the mill for the past year under the above management. I will try and give the general practice of the mill as we worked it out; the method being comparatively new in this section of the country.

The ore is brought by rail from their mines, in the Portland district, some 5 miles from the mill, and about 6 miles up from Deadwood. The ore is, for the most part, from flat formations. It is of a hard close-grained siliceous character and of several different varieties, all coming under the head of siliceous refractory ores. It varies from a comparatively hard, oxidized surface ore that is very good cyaniding ore, to a harder unoxidized blue ore, carrying some arsenic and arseno-pyrites, and not adapted to direct cyaniding. There are also several grades of brownish oxidized ores, well adapted to cyaniding after fine crushing. It is the aim to treat these oxidized ores, though some of the unoxidized gets mixed in, so that the mill tailings vary according to the amount of this blue ore present, other conditions being normal. All the ore carries considerable silver, some in the form of chloride, that extracts very readily.

In the mill work advantage was taken of the results obtained in the Dakota Co.'s experimental wet crushing plant, operated by John Henton, and published in this paper March, 1900. But in starting a plant of this type separating and treating slimes and sands, we found some new difficulties to overcome, and as my experience had been confined to dry crushing plants we had to "cut and try" on some points. After running through the winter with one shift per day the capacity was increased and a new boiler installed so that for the last two months we have been running twenty-four hours per day. The results are as satisfactory as have ever been obtained on this ore. The extraction is nearly 10% better crushing to 20-mesh, as compared with 10-mesh, as we started on. Finer crushing will increase the extraction even more.

In many ways the theory of cyaniding by crushing with stamps in a weak solution is ideal, as you get the air agitation and action of the cyanide in the mortars, even before the ore is crushed. With the use of lime in the batteries, no more cyanide is consumed than with a dry-crushing treatment, the consumption being seven-tenths of a pound per ton of ore, but the loss is close to one pound, as some cyanide goes to waste with the slimes moisture.

Slimes separation and direct treatment have in the past been somewhat of a difficulty, but they are now handled satisfactory in several ways in different mining countries. Devices used in sizing ores in concentration mills are being adapted to cyanide mills with good results.

The Portland mill receives the ore by rail, in bins above, thence it is run by car onto a short grizzly to a 10x20 crusher set at 2 inches. In six to eight hours one man can run and feed through enough ore to keep the mill supplied for twenty-four hours. I substituted compound cups in place of oiling by hand, so the crusher takes the minimum attention, and could supply ten or fifteen more stamps.

The crusher bins feed into four automatic battery feeders. The ore is stamped through 20-mesh screens by twenty 900-pound stamps, dropping 8 inches ninety-four times a minute. The stamps have a duty of about two and four-tenths tons on this hard ore. A weak cyanide solution of from one to one and eight-tenths pound per ton is used instead of water for crushing.

The battery product has 41% passing a 150-mesh screen. I will give the entire sizing test later.

The sands, slimes and solutions run from the battery to a spiral sand pump, which elevates it to one of the slime sand separators over each of the sand-leaching tanks. There are four of these leaching tanks 6 feet deep and 16 feet diameter.

We had some trouble with slime separation at first, and then, owing to a lack of elevation for a proper distributing arrangement, we put in a simple gravity settler box gotten out by B. C. Cook, and it is doing the work very well for our ore in small tanks. For large tanks or finer crushings, I will mention two other better ways before concluding this.

From these first slime tanks the excess of solution is drawn off clear by means of a floating hose, and is pumped to the battery tank for the crushing solution again. These slime tanks are only 8x10 feet, and too small for good settlers, but by placing a partition on one side of the tank, same as in a precipitation box, the slimes go down and settle nicely until

the tank is nearly full. It is necessary to switch the slimy solution back and forth so as to draw off the excess of solution clear. When one of the tanks gets pretty well filled up and the excess solution is drawn off, the slimes are discharged through a bottom trap-door into a lower slime tank, where the actual slime treatment begins, but at this stage 60% of the slime value has already been extracted by the weak crushing solution.

The box now in use, shown in cut, is about 3x4x5 feet. "I," the inlet, is a 3½-inch pipe from spiral pump. "O," the outlet, is a square covered launder, 12 inches wide and 5 inches high. "D," the bottom discharge door, is operated by a long handle. As the battery product comes in "I," the sands settle, while the solution and slimes flow out, "O." When the box fills with sand to "O" it is dumped through "D." The solution on top helps to spread the sand in the tank. This leaves a thin layer of slime on the sand after each dump, and more slime around the edges of the tank than in the center. This is taken care of by carefully raking over the slimes after the solution drains through just before time for the next dump.

All the slimes, outlet "O," go to a center common launder, on the end of which is a long 8-inch galvanized pipe tee, each end of which goes over a slime tank, and as the tee swings on the end of the launder the slimes can be run to either tank by raising or lowering one side of the tee.

The slimes treatment consists principally in washing out the values already in solution, during which time the rest of the cyaniding valves are extracted by pump agitation. We have three slime tanks 8 feet deep by 16 feet diameter, with false bottoms in them sloping toward two center discharge holes. These three tanks are in a row and have one common discharge pipe to waste or to a spiral pump, which is used as the agitator. The simple agitation by pumping from one tank to another, using an excess of barren solution and decanting, is the system used.

I have the tanks fitted and piped so that solution, water or steam can be put in from top to bottom. After agitation, filling up with solution and settling, the clear is decanted off by means of 2½-inch pipe working on a loose elbow at the center of the tank, and having a large square float at surface. This works very well, and is far ahead of the rubber floating hose: but probably the best arrangement in large tanks is the big funnel float as used in the Denver water works, that takes nothing but the uppermost thin sheet, and with a minimum disturbance.

In treating slimes we really reverse the leaching process by putting in barren solution at the bottom, settle and draw off at the top. We tried putting the solution on at the bottom, several different ways, but a central vertical pipe with arms on a swivel coupling about 2 feet from the bottom, proved the best, as the centrifugal force distributed the solution throughout the tank. But the principal agitation is from pumping the entire contents from one tank to the next. These tanks give us about four and one-half days treatment, but it is not sufficient time to make a complete saving. Nevertheless, the extraction obtained is close to 90%, while the saving is generally greater than 80%, which is better than that obtained on the sands. Before going to waste the slimes have several water washes, and then are decanted down to about 40% moisture, carrying 40 to 60 cents per ton in gold and from one-quarter to one-half pound of cyanide that goes to waste with the slimes.

Now returning to the sands. When leaching tank is filled up by the separator dumps the pipe from the battery product pump is switched to the separator over another tank. The excess solution is drained through the false bottom of the sand tank, thence going to the gold tank. The drain valves are closed and the tank is charged from the bottom with a three-pound solution—stands six hours, then after draining the crushing solution, carrying several dollars per ton, is circulated for three days. This is drained, the tank recharged and circulated with weak, barren solution before the wash waters are added.

The four tanks give us four and one-half days leaching. Small tests I made showed better results could be obtained by better leaching, or the time could be cut down by the pneumatic cyanide process. As it is, the extraction approaches 80%, and occasionally exceeds it, in gold. The silver extraction varies from 55% to 80%, according to the character of the ore.

A 45-ton sand tank is sluiced out an 8-inch pipe in from sixty to seventy-five minutes.

The crushing solution is supplied from solutions decanted from the slimes, and the solution is being continually used as a leaching solution and also run through a gravel filter to remove suspended matter, direct to gold tank and thence to zinc boxes. We have neat, handy zinc boxes, being made of standard 52-gallon barrels. We use two rows of six barrels,

each row with a double header. The barrels have the false bottoms and partitions, so as to bring solution up from the bottom. They make an excellent precipitation box, but before clean-up time they get so much gold in the bottom that the partitions overflow some. I have devised another arrangement with pipes to overcome this, and have a special series to be adapted to strong and another to weak solution and will explain them in detail in a future article.

In wet crushing the amount of solution constantly handled is in excess of dry crushing, and in a small mill, where the crushing, leaching and gold solutions vary but little, it is hard to keep value of gold solution up high enough to get the best product to clean up. The solution, before precipitation, runs about \$6 gold and one ounce of silver per ton; after precipitation 4 to 8 cents in gold and three ounces silver. It is possible the precipitation is aided by the silver making a "couple," as precipitation with gold and silver is in general better than with gold alone.

At first the "product" was shipped. Smelter returns were not satisfactory, so I started refining after designing and putting in a combination roasting and smelting furnace, now used by the Denver Fire Clay Co. with their furnace blue prints. I roasted the fine product direct and acid treated the rest. Acid treatment was carried out in a lead-lined tank; then, having no filter press, the slimes were washed and siphoned several times and dried by the furnace in two muffles 2x3 feet, then melted down with a 40% flux charge in No. 100 crucibles. My "maiden bar" of nearly 1000 ounces of bullion ran 970 fine, 705 fine being silver.

SIZING TESTS ON BATTERY PRODUCT.—With every ton of ore crushed there are five tons of weak cyanide solution that goes through the battery screen with this pulp. Crushed ore direct from the battery, using 10 and 20-mesh standard wire screens, gives:

| | 10-mesh screen. | 20-mesh screen. |
|---------------------------------------------|-----------------|-----------------|
| Pulp retained on 20-mesh..... | 9.00 | 0.4 |
| Pulp pass 20 and retained on 30-mesh..... | 17.00 | 6.0 |
| Pulp pass 30 and retained on 40-mesh..... | 8.25 | 7.2 |
| Pulp pass 40 and retained on 60-mesh..... | 15.75 | 17.2 |
| Pulp pass 60 and retained on 80-mesh..... | 9.00 | 10.4 |
| Pulp pass 80 and retained on 100-mesh..... | 1.75 | 7.6 |
| Pulp pass 100 and retained on 150-mesh..... | 11.00 | 10.0 |
| Pulp passing 150-mesh..... | 28.25 | 40.8 |
| Totals..... | 100.00 | 99.6 |

SANDS AFTER SEPARATION.

| | 10-mesh screen. | 20-mesh screen. |
|----------------------------------------------|-----------------|-----------------|
| Sands retained on 20-mesh..... | 21.0 | 1.00 |
| Sands pass 20 and retained on 40-mesh..... | 27.0 | 15.50 |
| Sands pass 40 and retained on 60-mesh..... | 20.0 | 18.75 |
| Sands pass 60 and retained on 80-mesh..... | 10.0 | 16.50 |
| Sands pass 80 and retained on 100-mesh..... | 1.5 | 7.75 |
| Sands pass 100 and retained on 150-mesh..... | 9.0 | 23.00 |
| Sands passing 150-mesh..... | 11.5 | 16.75 |

SLIMES AFTER SEPARATION.

| | 10-mesh screen. | 20-mesh screen. |
|-----------------------------------------------|-----------------|-----------------|
| Slimes retained on 40-mesh..... | 2.0 | 1.0 |
| Slimes pass 40 and retained on 60-mesh..... | 3.5 | 4.0 |
| Slimes pass 60 and retained on 80-mesh..... | 3.0 | |
| Slimes pass 80 and retained on 100-mesh..... | 2.5 | 1.0 |
| Slimes pass 100 and retained on 150-mesh..... | 14.0 | 4.0 |
| Slimes passing 150-mesh..... | 75.0 | 90.0 |

From these figures, by using a 20-mesh, you will see that the separation is not very close, but the sands leach very well with a 17% slime (that passing 150-mesh). But the slimes contain 10% that are coarser than 150-mesh. For best results this 10% should go into the sands, while a greater part of the slimes in the sands should be separated out.

A good separation can be made by a hydraulic cone separator, using weak solution instead of water. The sands from the cone sizer could be run through a distributor over the leaching tank, using more weak solution to aid in distribution. With ample-sized settling tanks the weak solution could be recovered again as fast as it was used, and make the process continuous.

It is merely the question of proper arrangement, giving elevation and with tanks large enough to do the work, using no slime tanks less than 16 feet diameter. In using the cone separators Mr. Merrill, superintendent of the Homestake cyanide mills, has an improvement in the shape of a small cone under the large one, and so slotted as to bring up the water uniformly, without currents. It makes a good separation on very fine tailings. Cone sizing requires a steady stream of wet-crushed ore. The spiral sand pump gives an intermittent stream, so it would require a small intermediate tank with outlet large enough to give a steady stream.

As I stated above, many devices used in wet crushing concentrating mills are being adapted to wet-crushing cyanide mills and tailings plants. While in Denver a short time ago, F. W. Hopkins of the Colorado Iron Works showed me a new screening device for either wet or dry sizing. It is a flat screen set at any pitch and operated by a multiple cam at each corner, which gives it an upward knock of several hundred per minute. The screen is brought back to place by springs. It has been tested, screening the

* See illustrations front page.

finer out to any mesh, including 120-mesh. It occurred to us that it could be used in cyanide mills of the above type very nicely. The screen could be set over the slime tanks and the separated sands could then be washed with weak solutions to an automatic distributor over the leaching tank, and thus get a perfect separation and distribution in cyanide solution. It can be adapted in several different ways, as circumstances demand. The screen is certainly a big advance in separating the fines in any kind of ore, wet or dry.

With the separating devices and various means of slimes treatment that are available to-day, direct crushing by stamps with weak cyanide solution can be made to give the best and most economical results on certain classes of hard, close-grained ore, thus making it possible to change many discarded stamp mills into modern cyanide mills.

The relative merits of wet and dry-crushing cyanide mills will be given a very good test this winter, as there is a new wet-crushing cyanide mill, similar to the Portland, and a dry-crushing mill that will be run on the same general class of ore in Deadwood, and may be the means of some valuable and interesting data.

The Portland mill has shown some advantages over dry crushing by rolls, and I believe we will hear more of direct wet-crushing cyanide mills in the future than we have in the past.

Deadwood, S. D., Oct. 17.

The Wealth of the World.

The wealth of the world is created, not by labor, as political economists and all superficial thinkers have falsely taught, but by ideas that save labor—that multiply the laborer's capacity. That all wealth is the creation of labor is a fundamental fallacy which can only retain the semblance of truth to such as are incapable or indisposed to think to the bottom of things. Labor unassociated with labor-saving ideas has never anywhere in the history of mankind been able to produce as much as was necessary for its own sustenance, but has had to draw on the bounties of nature for the balance. The man with the hoe is a man working in association with an idea that largely increases his capacity—an idea involving the application of the principle of the lever, which enables him to do more than ten men could do with their hands. The hoe, insignificant as it is relatively to-day, was an invention of revolutionary importance to mankind. It enabled man for the first time to create a surplus—which is wealth. The wealth created leisure, and leisure engendered ideas of comfort and stimulated progressive invention. Labor-saving inventions are the yeast of civilization. All labor-saving inventions are only contrivances to save wasted force. Most of the natural force of the world is still wasted for the want of inventions to utilize it. It would probably be a generous concession to man's pride in his ingenuity to admit that so much as 2% of the visible and calculable force of nature has yet been harnessed into his service—we are still so far as that from the climax of civilization.—Joseph H. Hutchinson.

PLUMB LINES 4250 feet long were lately swung in Shaft No. 5 of the Tamarack copper mine in the Lake Superior copper regions. It was decided to cross-cut at the 29th level, at a point 4250 feet below the surface, and two plumb lines were dropped to give the direction. No. 24 piano wire was used, and this wire was lowered from drums attached to a small two-cylinder hoisting engine placed at the mouth of the shaft. To carry the wires down and prevent entanglement in the timbers two "balloons" were used. These were made of wood, were 10 feet long, 2½ feet diameter at the center and tapered to a point at both ends, and weighed twenty pounds each. A lantern was swung in the center of each balloon. The lines were dropped to the bottom in thirty minutes, and 8-pound plumb bobs were substituted for the wooden ones until the wires were adjusted for distance. The 50-pound bobs were attached and the wires stretched 15 feet, requiring that much to be cut off of each. When all was ready the bobs were immersed in two pails of engine oil, to check vibrations; but here something unlooked for occurred, as the wires shortened up 25 inches because of the buoyancy of the oil. A similar set of plumb lines was swung in Shaft No. 2, 3220 feet distant from No. 5, at the surface. In both cases a divergence of about ¼ foot was noted in the distance of the wires from each other; at the top of the shaft the distance was 12.6 feet, and it was 12.7 feet at a point 4250 feet down. Lead bobs were tried instead of the iron ones, but without changing the result. No explanation is given for the disturbing force in the account so far published.

The Aspen tunnel, on the Union Pacific Railway in Wyoming, opened to traffic in October, is 5900 feet long and pierces the Aspen range, one of the eastern foothills of the Wasatch mountains. Its construction was attended with great difficulties, owing to the presence of a large volume of water met at different points in its length, gas and crumbling shale. In some places the material swelled like a sponge, crushing all timbering and necessitating the use of iron and steel to brace the heaviest timbers obtainable. Work was commenced on the tunnel ten years ago.

Some Pumping Data.*

By T. L. WILKINSON.

The largest Cornish pumping plant in the world is the huge Chapin pump of the Chapin Mining Co. at Iron Mountain, Mich. The pump is designed to pump 3000 gallons per minute from a depth of 1500 feet. Some idea of the enormous proportions of this pump may be found from its dimensions. The engine is of the vertical type and compound, and stands 54 feet from the floor. The high pressure cylinder is 50 inches and the low pressure cylinder is 100 inches in diameter, and the stroke is 10 feet. The flywheel is 40 feet in diameter and alone weighs 164 tons, without doubt the heaviest flywheel ever built. The total weight of the engine, exclusive of pumps and shaft work, is 600 tons.

The pump end is attached directly to the beam end which overhangs the shaft. The pumps are of single-acting Cornish type, with plungers 28 inches in diameter and 10-foot stroke. The number of strokes varies from four to ten. The pumps are arranged in series, each set having a lift of about 200 feet. This plant was designed and built by the E. P. Allis Co. of Milwaukee.

Perhaps the largest pumping engine in the western part of the United States is the large Cornish pumping engine at the Ontario mine at Park City, Utah. I quote largely from the article of W. P. Hardesty on this subject.

As the various shafts and levels have been extended the amount of water to be handled has steadily increased. Up to the time that the drainage tunnel was constructed from No. 3 shaft, at the 600-foot level, all the water—amounting to about 4500 gallons per minute—was pumped and discharged through a short tunnel about 500 feet from the surface. This first drainage tunnel from No. 3 shaft carried off all the water of the mine as low as the 600-foot level.

Below this level, however, all the water had to be pumped, and it was decided to erect a large Cornish pump. The large pump, which was installed at the mouth of shaft No. 3, was from the design of W. R. Eckhart of San Francisco.

"The two large cylinders are nearly vertical, being at the same height and inclined toward each other at the top. The high pressure cylinder is 38½ inches in diameter, and the low pressure 70 inches, and the stroke of each 10 feet. The cylinders are both steam-jacketed, and have cut-off valves, though the steam is usually controlled by the throttle valve. The piston rods are connected to the opposite ends of a walking beam or 'bob,' while the connecting rod to the crank which turns the flywheel is attached to a pin at the top of the bob. This connecting rod is 28 feet long, while the arms are 14 feet 6 inches. The flywheel is 30 feet in diameter and weighs fifty tons, its shaft being 22 inches at the flywheel, 16 inches at the outboard and 20 inches at the crank rod journal. The engine's speed is five to seven revolutions per minute, and it works with a steam pressure of 100 pounds. The engine uses a jet condenser. The connecting rod to the pump rod is attached to the bob at the same end as the connecting rod of the high pressure cylinder, but lower down, the distance from center of pins being 4 feet 2 inches, with 14-inch diameter journals, the journals for pins for the engine connections being 10½ inches in diameter. The total weight of the bob is seventy-five tons. The foundations of the engine are 54 feet below the surface, the cut stone necessary being carried up. Over 7000 tons of quarried work were required in the foundations. The pump shaft is 7x9 feet, with enlargements at pump and bob stations, and is heavily timbered.

"The pumps are located at the 1000-foot and 800-foot levels, water being pumped up to the 600-foot level. The pump rod is made of 16-inch square Oregon pine, in 60 to 80-foot lengths, the joints being made by four straps of iron 1x12 inches by 30 feet, thus giving a lap of 15 feet. The two pump columns are 18 inches in diameter and are riveted wrought iron.

"At the 300-foot, 500-foot and 700-foot levels are placed balance bobs connected with the pump rod, the design being to give the engine the same amount of work on the up and down strokes.

"These balance bobs each have counterweights of twenty-nine tons. The two pumps at the 1000-foot level have 20-inch plungers, with 10-foot stroke. The sump is 45 feet deep, but is nearly always full, the suction never exceeding 10 feet. Between 300 and 350 gallons are pumped at each stroke, the water discharging from the lower pumps into a tank located upon the 800-foot level, where two pumps similar to those at the bottom are put in. The capacity is about 2500 gallons per minute. The engine and pumps cost at the factory \$110,000, while the total cost, including foundations, erection, buildings, pump, shaft equipment, etc., was about \$250,000. Besides the Cornish pump, there are four steam pumps underground to relieve it in emergencies, and to act as auxiliaries during the largest flows of water. There is one each at the 1000-foot and 800-foot levels of shaft No. 3. These are 23-inch and 42-inch Knowles compound pumping engines, and have a capacity of

1600 gallons per minute raised 200 feet, the raise being divided into 200-foot lifts by the 800-foot level. There are two additional columns of 15 inches diameter each in the pump shaft for these pumps. Steam is supplied to the pumps in No. 3 shaft by a 6-inch pipe, jacketed with 1½ inches of asbestos, and about 1000 feet long in all. The work done by the Cornish pump has been a great saving over the direct-acting pumps underground. Coal is hauled from the mines at Coalville, 22 miles distant, on the Union Pacific Railway, and costs \$4 to \$4.50 delivered at the mines."

In 1888, at the Ontario mine, a tunnel was begun at the foot of shaft No. 2, at the 1500-foot level. It required six years of the most difficult kind of work, with many mishaps from excessive flows of water, to complete this work. The tunnel was entirely through rock—no earth at all. The tunnel is about 3 miles long and cost in the neighborhood of \$500,000, complete.

The large amount and continuous flow of water through this tunnel led to the idea of using this otherwise wasted energy. A plant was determined upon to utilize this water to light the mine and furnish power for the shops of the mine.

The plant is driven by a 3-foot water wheel, which is estimated to deliver to the main belt 80 H. P. at 280 revolutions under an effective head of 120 feet. The dynamo is an eight-pole 60 K. W. monocyole alternator, driven at 900 revolutions by a 12-inch belt from the pulley on the wheel shaft. The length of the line of transmission is 6½ miles over a rough and broken country, 9000 feet above the sea level. The loss in transmission at full load is estimated to be 11%. This plant supplies light to 700 lamps of 16 C. P. at 110 volts, also drives three motors, two of 15 H. P. and one of 25 H. P.

"Two engineers are employed to run the Ontario electric system, each of whom runs the plant twelve hours daily. No labor is involved, owing to the steadiness of the load both day and night, the attention required in the power house being limited to the inspection of oil in the various bearings and the starting and stopping of the plant at the beginning and end of each run, at which time the machinery is wiped off. The entire system at any instant involves only the attendance of the engineer at the power house, who also makes any slight repairs or alterations required from time to time throughout the distribution. The operating expenses, therefore, include only the engineer's pay, occasional repairs and lamp renewals."

It is estimated that the saving in oil and fuel by the use of this plant is \$3000 per year.

The drain tunnel is being extended so as to drain the Daly mine also. This will give additional power and the present plant has probably been enlarged, as was contemplated. In this way Park City may be lighted and also power supplied to various industries, thereby making the plant pay dividends.

The great Cornish engine is retained to put into service when the time comes to go below the 1500-foot level. The steam pumps which were used underground have been taken out, chiefly on account of excessive cost of operation and partly on the supposition that the Cornish pump will be able to handle the water until a very much greater depth than 1500 feet has been reached, as the drainage tunnel takes care of all the water above the 1500-foot level. The Cornish pump would pump and discharge all water below the 1500-foot level into the drainage tunnel, thus increasing the power of the electric plant.

H. C. HOOVER, M. E., who has spent several years in China, says of gold mining there that, "theoretically, the precious metals are the property of the Emperor, and private individuals are not allowed to mine; but, practically, the Chinese mine everything that contains a color of metal as far as their appliances permit. The Chinese have, according to their histories, mined gold in these regions for more than 1000 years. The striking feature about Chinese mining is that a Chinese farmer, working in the winter time, when otherwise he would be idle, will keep going if he can get 2 cents a day. And he will work down to water level gold quartz veins 5 inches wide worth but \$3 a ton. If we would take any given region in California and work all the veins of that size, we would have the country simply dotted with mining dumps, and in any given region the percentage of gold-bearing veins over 5 inches wide which would pay by modern methods would probably not be 1 in 1000. Then, if we consider that all such workings are covered in, we have the condition of things in North China. For the engineer or prospector to know anything of the value of that country is impossible unless a shaft be sunk and a pump erected on each ancient working. With a proportion of 1 success in 1000 of such expensive operations, it is evident that there is a peculiar bar to the development of China's precious metals."

WIRE-WOUND cast iron water pipe consists of steel wire being bedded in grooves cast in the body of the pipe, and the ends secured by pouring molten tin over them. The whole is then given an asphaltum coating. Trials with pipes thus fortified are said to have given excellent results, and a large water main on this principle is stated to have been put down in Paris.

*Proceedings of Colorado Scientific Society.

Late Gold Dredging Practice.*

NUMBER III.

Written for the MINING AND SCIENTIFIC PRESS
by RALPH L. MONTAGU.

The modified type of dredger is herewith illustrated (Fig. 2).

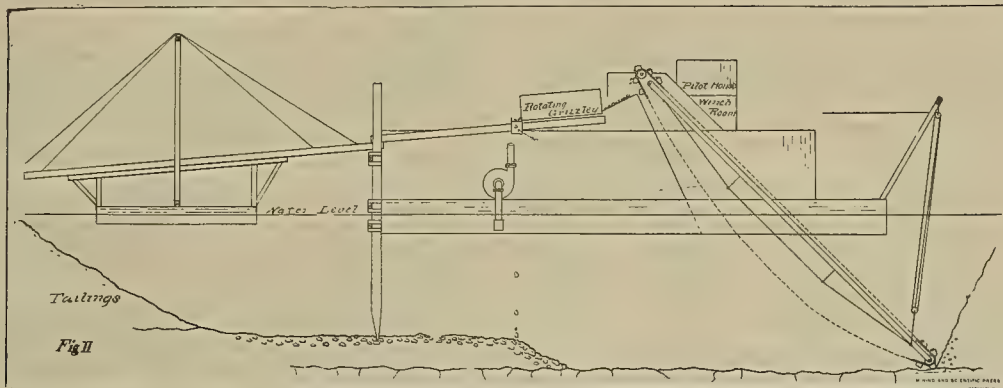
Where the gravel is not too coarse, the capacities of both these dredgers can be increased about 60% by replacing the links that connect the buckets

It is not advisable to let large boulders (above 200 pounds) dump and go through the grizzly; these are taken out of the buckets as they come up and are rolled overboard.

It takes very little more power to drive a close-connected chain than an open chain; the weight of the extra buckets and the gravel in them is the only factor to be considered; the load on the engine or electric motor is much steadier than it is with the open type.

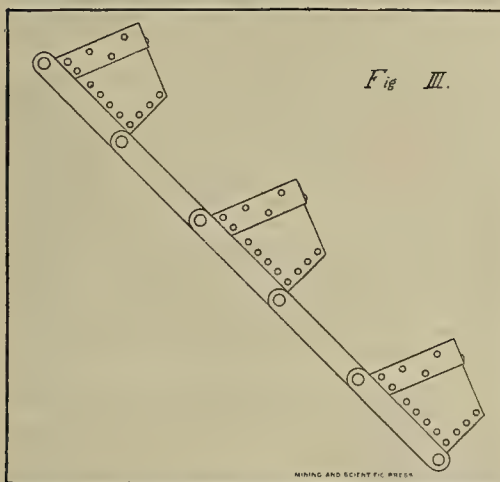
built by the Risdon Iron Works, have a chain of alternate buckets and links, which differ from those of the Bucyrus Co. in their construction and in the method of connecting them together.

The excavated gravel is dumped into a rotating



(Fig. 3) by buckets; this is known as the continuous or close-connected type. (Fig. 4.)

Where there are a number of large boulders pres-



ent in the gravel, the close-connected type is not advisable, because the boulders that are too large to go through the grizzly get wedged in the buckets and are very hard to get out.

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There is not much to choose between these two dredgers. Local conditions must guide the engineer in his selection.

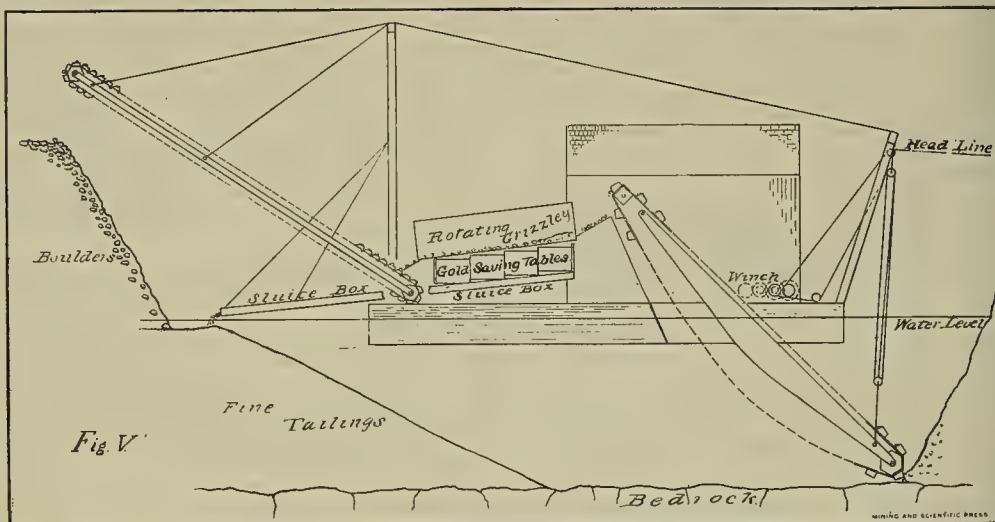


Fig. 5 illustrates a type of dredger that was developed in New Zealand, and a number of them are in operation in California. These dredgers, which are

grizzly; the screened material passes over special gold-saving tables and, falling into a small sluice box, is conveyed to a sump, from which it is lifted by a

centrifugal pump and discharged above and astern of the dredger.

It is not necessary to keep this sand pump running

Pacific Coast Smelting and Refining Works, Copper King, Ltd., Suisun Bay, Cal.

Smelting and Refining Works, Copper King, Ltd.

The growing interest in mining and smelting on the Pacific coast is manifested in the recently completed smelting works of the Copper King, Ltd., illustrated herewith. These works were put in commission last April for the ores of the Copper King mine, located in Fresno county, Cal., but they have since that time been increased to double their original capacity, and they are now prepared to handle over 200 tons of ore per day and within the next sixty days expect to increase to a capacity of 300 tons per day. We have the assurance of the management that the company is prepared to increase the plant to meet the de-

mands of the business, whatsoever they may be. The company is now in the market for the purchase of all gold, silver and copper ores. The plant is fully equipped with sampling mills, ore roasting buildings, smelters and converters. This company enjoys the prestige of having poured the first bar of converter copper ever turned out on the Pacific coast. The first bar was poured on May 1st, 1901.

The smelter is located directly upon Suisun bay, Cal., 1 mile from the two trunk systems of this coast, the Southern Pacific and the Santa Fe railroads, to which they are connected by their own individual railway, thus giving them complete communication either by rail or water. In their operations they

use petroleum exclusively, not only for generating power but in the process of smelting.

The works are the ownership of the Copper King, Limited, and in the first instance, the erection of the works on the bay of San Francisco, was not contemplated. It was their intention to establish the same at their mines in Fresno county, Cal., but owing to the lack of water, fuels and fluxes, and furthermore, the possible difficulties that might grow out of operating there because of the injurious fumes, it was determined to establish smelting works on San Francisco bay, to handle not only the ore from the Copper King mine, but also to go into the custom business generally.

continuously; it is put in operation as occasion demands.

The coarse material from the grizzly is elevated and dumped behind by means of a stacker, which is either an endless chain of buckets or a belt conveyor.

The operator stands on the lower deck on the left side. The winch for hoisting the ladder and swinging the boat is placed handy.

A head line is used instead of spuds to hold the dredger to its work, and there are two side lines on each side of the boat, one at the bow, the other at the stern, to swing the dredger across the face of the cut. A dredger of this type with 3-cubic-foot buckets will handle 600 cubic yards per day under working conditions.

These dredgers are worked by starting digging on the surface and going straight down; the ladder is then hoisted and the dredger moved sidewise about the width of the buckets, which are lowered again, and the process is repeated until the full width of the cut has been dug out; the dredger is moved ahead by hauling in on the head line.

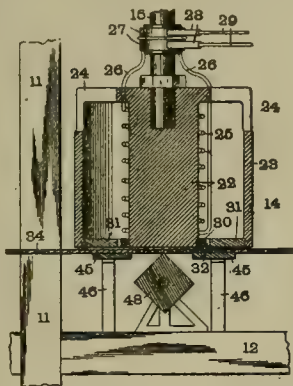
(TO BE CONTINUED.)

Mining and Metallurgical Patents.

Patents Issued November 5, 1901.

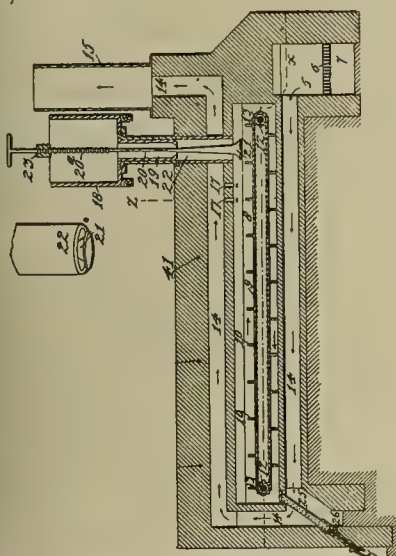
Specially Prepared for the MINING AND SCIENTIFIC PRESS.

MAGNETIC ORE SEPARATOR.—No. 685,817; W. P. Cleveland and C. E. Knowles, Joplin, Mo.



An electro-magnet mounted on a vertical axis and composed of core and shell between which exciting coil is wound, an annular magnetic gap in under face of magnet, a traveling conveyor of flexible material for carrying material across gap but arranged to leave a portion of gap exposed, a rotating brush arranged adjacent to exposed portion for removing material adhering to magnet, and an agitating device acting on conveyor.

ROASTING FURNACE.—No. 685,903; J. A. Bentley, Denver, Colo.



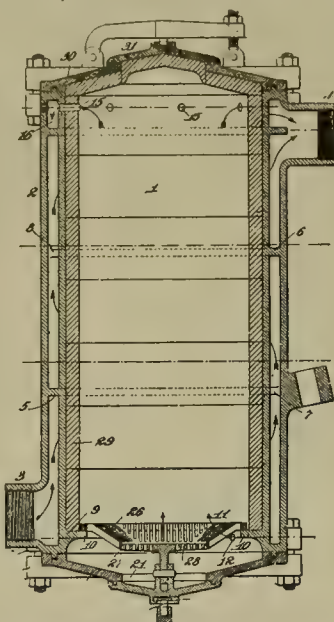
A muffle oven, a fire box, a stack, a hot air flue surrounding oven at bottom, rear end and top, and communicating at one extremity with fire box and at other extremity with stack, a feed channel communicating with oven, means for controlling volume of feed passing therethrough, means for preventing escape of hot air, gases, smoke and vapor and ingress of cold air through channel, a chute leading from oven through hot air flue and furnace wall for discharge of roasted material and for heating and admitting into oven atmospheric air, means for preventing ingress of cold air into oven through chute, means for exit from oven of air, gases, vapors and smoke, and means for mixing and moving along upon oven floor substance being roasted.

SEPARATOR FOR PLACER MINING.—No. 685,773; J. N. Lewis, Ann Arbor, Mich.



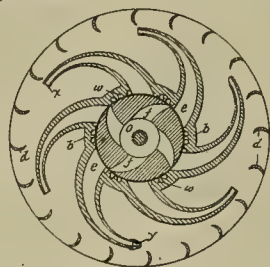
A plurality of sluice boxes, means for oscillating sluice boxes in a horizontal plane, transverse arms or brackets operatively connected with and supported by means and constituting supports for sluice boxes which latter have a pivotal or tilting connection with arms or brackets whereby the sluice boxes are adapted for inversion, and means for normally maintaining sluice boxes in horizontal position.

APPARATUS FOR REHEATING COMPRESSED AIR FOR INDUSTRIAL PURPOSES.—No. 685,911; T. A. Edison, Llewellyn Park, N. J.



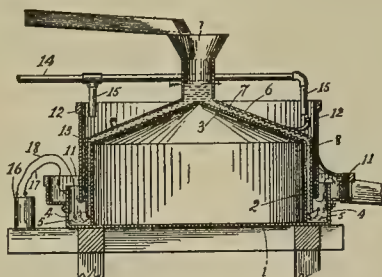
A reheating chamber, a jacket surrounding it, a grate in chamber for carrying a combustible material, air pipes leading directly to and directly from jacket, an opening connecting space inclosed by jacket with interior of reheater below grate, whereby a portion only of air will be admitted into interior of reheater to support combustion of combustible material, and means for conducting directly heated air to discharge pipe which leads directly from jacket.

ROTARY WATER MOTOR.—No. 685,967; L. E. Boovist, Seattle, Wash.



Two concentric wheels adapted to be rotated in opposite directions, inner wheel having water passages therein formed in curves adapted to discharge water tangential to buckets on outer wheel, in combination with depressions formed between water passages of inner wheel on hub.

AMALGAMATOR.—No. 686,231; G. W. Lee, San Francisco, Cal.



The base plate, an inclined distributing plate connected to it by wall or plate, an amalgamating trough, an inclined cover plate terminating in a downward projecting flange which extends to within a short distance of bottom of amalgamating trough, a tapering feedway between distributing plate and

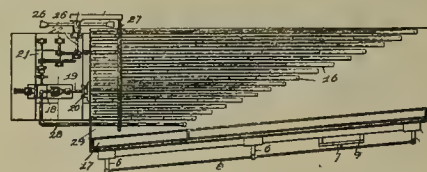
cover plate, through which ore or pulp flows by gravity, an ore or feed hopper upwardly projecting from cover plate, which hopper communicates with ore feedway, an ore sluice by means of which ore or pulp is conveyed toward feed hopper, a wall or plate surrounding depending flange of cover plate so as to form a waterway, wall or plate terminating slightly above surface of bath contained within amalgamating trough, a water-supply pipe arranged above cover plate and overflow gutter connected to amalgamating trough, into which base material or tailings is forced.

AIR COMPRESSOR.—No. 686,115; F. A. McRae and C. E. Robertson, Montreal, Canada.



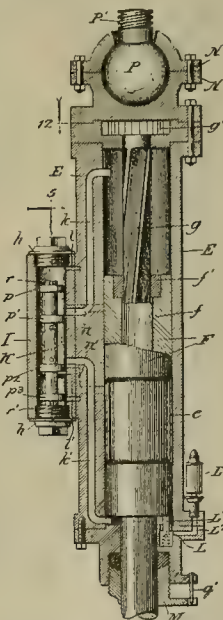
An inclined water conductor communicating at its upper end with a water head, a cylinder, with inlet opening, lower end of conductor being connected to and communicating with opening, a series of upwardly extending deflecting vanes independent of one another, located within cylinder at opening, a blower for forcing air into cylinder, an air-conducting pipe leading from blower to a point within conductor and in close proximity to cylinder, a suitably mounted shaft located above surface level of water head, a pulley mounted upon shaft, an endless belt taking over pulley and extending to within a short distance of upper end of conductor, a series of tilting buckets pivotally secured to belt, a second pulley mounted upon shaft and an endless belt operatively connecting second pulley to blower, a water-discharge opening from cylinder and an air outlet from cylinder.

ORE CONCENTRATOR.—No. 686,088; J. Klein, De-sloge, Mo.



A rigid metallic frame, a number of strips secured to it and forming top of table, means for feeding ore onto table in a steady stream, a series of parallel metallic troughs or channels removably secured upon top of table and extending longitudinally on it transversely of feed of ore and tapering from front to rear of table, means for tilting table, means for retaining table in different positions and means for reciprocating table.

STEAM STAMP MILL.—No. 686,149; E. L. Sharpneck, Chicago, Ill.



A cylinder and plunger-carrying piston, a valve chamber, ports leading from valve chamber to cylinder at both ends thereof, a slide valve in chamber, ports leading from middle to each end of valve chamber through slide valve, exhaust passages leading from opposite ends of slide valve all opened and closed by piston in cylinder and adjustable exhaust-regulating means in one passage for controlling speed of exhaust from that end of slide valve in movement of piston.

Hydraulic Mining in Low-Grade Gravel.*

By WILLIAM H. RADFORD.

Having worked some rather low-grade gravel during the past season at a small profit, I give the actual figures, in the hope that other mining engineers interested in this line of work may thereby be induced to do the same, in order that we may all get more data on this little-ventilated subject.

The property here referred to is situated in one of the northern counties of California, where hydraulic mining is still permitted by the courts. The water right belonging to the mine is a good one, furnishing water during about nine months, whenever there is an average rainfall, and a fair proportion of the precipitation is in the form of snow. The ditch, about 11 miles in length, is cared for during the rainy months by two men, and during the rest of the year by one man; and the water cost last season, delivered at the mine, 0.69 cent per miners' inch. The season commenced in November, 1899, and ended the last of July, 1900. During this time 655,657 miners' inches (an inch equals 1728 cubic feet in twenty-four hours) of water were used for piping and for sweeping the bedrock at the end of the season. From actual surveys, this amount of water washed down 1,251,399 cubic yards of material, consisting of pay gravel lying on the bedrock, and varying in thickness from a few inches to 8 feet, and practically barren top material, consisting of mountain slide, carrying considerable broken rock, clay and soil. The banks varied in height from 50 to 130 feet, the average height being 63 feet. The grade of the sluices was 7 inches to 12 feet, the boxes being paved with block riffles 12 inches deep. Long bedrock cuts extended from the heads of the sluices to within a few feet of the banks, and were kept practically to grade as the work advanced. At first electric drills were used on this work; but as it was found that heavy blasting shattered the rock too much and caused slips, these drills were abandoned and hand-drilling was substituted. The bedrock cuts, run in black slate of poor quality, had to be constantly watched and in places timbered to prevent accident. Electric lights were used in the mine during the night time and in the tunnel while cleaning-up was going on. Seven clean-ups were made in the sluices during the season, and at the end of the run the bedrock which had been uncovered was well swept and everything piped down into the bedrock cuts; these were run down, carefully cleaned and creviced up. The result of the season's work was \$31,618.49, showing a value of only 2.52 cents per cubic yard for the material washed. The bullion obtained came from the following sources:

| | | Per cent. |
|------------------------|-------------|-----------|
| Sluices | \$27,315 40 | 86.39 |
| Bedrock ditches..... | 3,811 23 | 12.05 |
| Undercurrents (2)..... | 491 86 | 1.56 |
| | \$31,618 49 | 100.00 |

The undercurrents were run only three months and a half.

The cost of operation for the season was \$27,511.64, which, deducted from the \$31,618.49 of bullion produced, left a profit of \$4106.85.

The total cost was made up as follows:

| | Cost. | Cost per cu. yard. |
|------------------------------------------------------------------|-------------|--------------------|
| Cost of ditch, reservoir and siphon: Labor..... | \$2,670 99 | |
| Supplies..... | 115 55 | |
| | 2,786 54 | \$0.00223 |
| Washing (piping)..... | 2,401 05 | 0.00192 |
| Drilling in bedrock cuts: Hand-drilling.. | 1,050 91 | |
| Electric..... | 269 62 | |
| | 1,320 53 | 0.00105 |
| Timbering bedrock cuts..... | 157 39 | 0.00012 |
| Electric lighting..... | 598 62 | 0.00047 |
| Sluice building and re-pairing: Labor..... | 1,045 70 | |
| Supplies..... | 35 50 | |
| | 1,081 20 | 0.00086 |
| Blacksmithing | 644 02 | 0.00051 |
| Cleaning-up..... | 898 85 | 0.00071 |
| Moving pipes and giants..... | 6,124 91 | 0.00490 |
| Breaking rocks and clay..... | 158 37 | 0.00012 |
| Clearing ground for piping (cutting brush)..... | 3,088 69 | 0.00250 |
| General expenses, watching sluices, and odd jobs..... | 3,015 37 | 0.00241 |
| Supplies used in mine..... | 4,267 31 | 0.00341 |
| Taxes, office expenses, legal expenses, surveying, salaries..... | \$27,511 64 | \$0.02198 |

A resume of the season's work is as follows:

| | |
|-----------------------------------------------|-------------------------|
| Period..... | 9 months. |
| Water used..... | 655,657 miners' inches. |
| Material washed..... | 1,251,399 cubic yards. |
| Cubic yards per miner's inch..... | 1.91. |
| Area of bedrock uncovered..... | 7.314 acres. |
| Bullion produced..... | \$31,618.49. |
| Average yield per inch of water..... | 4.82 cents. |
| Average yield per cubic yard of gravel..... | 2.52 cents. |
| Average yield per square foot of bedrock..... | 9.8 cents. |
| Yield per acre..... | \$4,323. |
| Average height of bank washed..... | .63 feet. |

The washing of such poor gravel during the past season was due to the fact that the company was fin-

ishing up work on one of the benches before moving to another place, and, in doing this, had to wash a large proportion of rim gravel—that is, gravel not in the channel and usually of low grade. Though the profit obtained was small and the final result could hardly be considered a very satisfactory one, still it shows that, under fairly favorable conditions, gravel of quite low grade can be worked at a profit.

Losses in Copper Smelting.

R. C. CAMPBELL-JOHNSON, M. I.

As Cornwall has taught the present age the art of mining, so Swansea, in Wales, has taught the art of smelting. Let us see, then, what loss of copper they allow in their works, and later how far their more perfect methods are adaptable to other parts, or wisely to be modified to local conditions where from higher costs a greater loss of copper in the slags is justifiable. There is a perfect mixture, as a flux for smelting, of lime, iron and silica (quartz), added to the copper ore that will minimize the loss of copper in the slags formed to about one-tenth of 1% in the short ton—that is, two pounds of copper. Suppose, for argument, that the ore is half the burden of the furnace, and the fluxes are the other half of the burden. Then the loss on the ore is double what it is in the slags. This one-tenth of 1% is the acme of smelting, so, as well as the mixtures having to be correct, the furnace has to be in good running order, and the furnacemen to be skilled in order to attain it.

Therefore this acme is seldom attained and modifications are adopted. First, the cost of smelting worthless fluxes is high and another ore with some values in it resembling the fluxes in constituents is used. This, not being quite the acme, raises the loss of values in the slags. Then the furnacemen, when not on contract, have been known, during the night shift, to shut off the blast and take a siesta, by which proceeding the manager's mixtures are knocked endways. At Swansea, from the outer hearth of the furnace the slags are tapped with an upper launder into slag pots of a conical shape and the copper matte is tapped from a lower hole into sand moulds. When the slag in the pots is cooled off these are dumped on a slag floor. A man is kept to daily sample and examine these cones of slag. He spots any matte showing at the top of the cone where it has settled in the cooling, breaks that top off and sends it back to the furnace; also the last six pots, before the blast is shut off and the matte tapped, he invariably returns to be put through the furnace again.

Outside of these slags returned to the furnace he takes an average sample of the run of slags for the twenty-four hours. This sample is assayed by Parkes' assay. The general practice is to pass slags as clean containing eighteen-hundredths of 1% copper, equal to three and six-tenths pounds of copper on the short ton. Two-tenths or more of 1% are called four slags, and the whole run is by degrees remelted again. This loss in producing the first metal is the only loss in the whole process, since the slags, crumbs or skimmings, from the roasting—not calciners, called roasters on this continent—running down the converter and refining furnaces are remelted.

These Swansea methods are the most perfect employed in copper smelting, but in new countries where labor is high they have to be modified, resulting in a greater loss of values in the slags. First, the slag from the furnace runs into a stream of water is granulated, carried away and lost. Correct sampling is impossible, and accidental losses have to be pocketed against the less cost of handling. Secondly, too much blast is driven into the furnace and the amount daily smelted is larger in tonnage, but the loss in slags and fumes is heavier. Again, automatic feeding of the furnace is resorted to.

Should the tuyeres (the apertures in a furnace through which the blast enters) become chilled, and a snout of black burthen form on one side, showing that the furnace is out of running order, then by automatic feeding the furnace cannot be humored by feeding coke to that side to raise the heat, etc., and so be brought back into condition. This makes loss in slags, but still is compensated for by saving cost of labor. Ores have to be made self-fluxing by tricks in the trade, perhaps by using more coke, or methods of mixing green unroasted ore, or fluxing with first metal back again. The mixture, not being up to acme, creates higher losses.

All these modifications are adaptations to local circumstances, and probably pay in the long run. What, then, is the loss of copper in the slags under these modifications?

These facts about smelting are given to teach the public what to expect and enable them to see that they get it, or ask the reason why—so to familiarize themselves with smelting propositions, and not jibe at investing.

The public will promptly ask why do custom smelters only pay for 90%, pay the market price less 6 cents per pound, use dry, electric and other methods of assay then used to estimate their slags, and other leading questions.

These are the business of a custom smelter. If a company does not like it, let them put up their own smelting works and keep the profit in their own pockets. A nod is as good as a wink to a blind mule. —British Columbia Mining Record.

New Placers, Horsefly River, Cariboo District, B. C.

TO THE EDITOR:—You have no doubt noted the reports that a rich placer find has been made on the headwaters of the Horsefly river, in Cariboo district. As usual in such cases, the first accounts published are more or less exaggerated, and some of the publications are misleading and calculated to cause undue excitement and disappointment to many who will try to get to the new El Dorado before it is possible to do so. I will aim to give you the situation and conditions that exist at the present time. There is no doubt about the richness of the creek, which the discoverers named Eureka creek. There are also indications of rich creeks in the vicinity, as the gravel extends for a distance of 12 or 15 miles.

The Horsefly river is a stream about 100 miles long, emptying into Quesnelle lake, and is a part of the watershed of the Fraser river. It heads on the dividing range that divides the Clearwater, a tributary of the North Thompson river, and the Horsefly country. Eureka creek, on which the discovery was made, is a tributary of the south fork of the Horsefly and is about 200 miles north of Ashcroft, on the Canadian Pacific Railroad. It is reached over the Cariboo wagon road from Ashcroft to this point, a distance of 150 miles, thence by trail about 65 miles up the river, or by way of Horsefly lake and trail. It has been known for many years that there existed an extensive system of ancient or dead river channels covering a large area of country. They are traceable for 40 miles up the Horsefly. These ancient channels, though known to be rich, require large capital for development. Several companies have been operating in the district for several years and considerable gold has been taken out, and there has also been some extremely rich gravel discovered, but the output thus far has not been sufficient to attract mining men with capital.

About 60 miles above the mouth of the Horsefly the river forks, the branches running off into high mountains. At the forks, and for a few miles up the south fork, quite extensive deposits of gravel exist. Some prospecting has been done there and locations made. In June last the owners of the leases took parties in with a view of making a sale of the ground, not being able to equip it themselves. After prospecting the ground thoroughly they were so well pleased that they took a bond on the property for \$22,000, running until the 10th of November, 1901, when they expect to close the deal. Some of the present owners of the leases decided to go up the south fork on a prospecting trip. After a difficult tramp of 8 or 10 miles they came onto the present Eureka creek, where they found good prospects on the surface, in a few hours panning out over an ounce. Their provisions being about gone, they made locations, named it Eureka creek, started out for a fresh supply of provisions. On their arrival at this camp it made considerable excitement. As they had the gold to show, it was believed the find was genuine. They returned at once to do more prospecting. Quite a number went in and soon the whole creek was located.

Other creeks were found that prospected well on the surface, but, there being no trails, it was impossible for a man to carry tools, bedding and grub enough to last him more than a couple of days; so, very little prospecting has been done as yet. It is unfortunate that the discovery was made so late in the season, as the elevation is over 5000 feet, and the snow fall will prevent any more prospecting until spring. The discoverers on their return did more prospecting and, from what gold they got, believe they can make from \$20 to \$40 per day to the man on the creek.

The gold is of good quality, some quite coarse. They report the entire country covered with quartz. On Eureka creek, where the discovery was first made, and Fraser creek, which is some 4 miles above, immense quantities of quartz boulders cover the beds of the creeks. The formation is slate, with granite lying to the north.

Along the main south fork below these creeks for 10 or 12 miles there are extensive benches, all of which prospect on the surface. There is plenty of timber and water and the ground is covered with a heavy coat of moss. Many men have gone in to make locations, but little or no work can be done until trails are made and supplies got in.

At the present time it is simply a climb over fallen timber and underbrush. They could only make a mile an hour with the loads carried. It is simply madness to try to get in there now, as storms have already set in and much snow has fallen. There is hardly a doubt but there will be extensive placers discovered in the spring. Enough has already been done to attract the attention of prospectors next year, when there will no doubt be a great many go in.

There seems to be quite a territory that has never been prospected. There is not the least sign that there has ever been a white man on these creeks. Not a pick mark, ax mark or the evidence of any camp fire is anywhere to be seen. It is quite likely that 1902 will do as much to bring "Old Cariboo district" before the world again as 1862, when Cariboo first had her big boom.

R. H. CAMPBELL.

Harper Camp, B. C., Oct. 30.

* Trans. American Inst. Min. Eng., Mexican meeting, Nov., 1901.

MINING SUMMARY.

Specially compiled and reported for the
MINING AND SCIENTIFIC PRESS.

ARIZONA.

COCHISE COUNTY.

The Melba M. Co. is developing the Alta mine, near Tombstone, which has been idle many years. A new hoist, boiler, gallow-frame and pump have been installed and the shaft has been repaired and is being sunk from the 150 to 400-foot level. The ore is lead and silver and copper glance. R. L. Hamlin is Supt.

GILA COUNTY.

The Black Warrior C. Co. (Amalgamated), at Black Warrior in Globe district, has under construction a sulphuric acid plant. Its capacity is expected to be 10,000 pounds of acid per twenty-four hours. The main building is 210x65 feet, height 31 feet. Besides the main, or hammer, building, there are towers and furnace room, the last 44x52 feet. The main building has three lead chambers for condensing the sulphur fumes as they come from the furnaces; No. 1 chamber is 200 feet long by 25 wide and 20 high; No. 2 chamber 162x25x20 feet, and No. 3, 5x25x20 feet. The Glover tower is 10x10 25 feet, and Gay-Lussac tower 7x9x38 feet, surmounted by tank rooms. About 60 tons of sheet lead will be used. Lead ore chambers are six and seven pounds weight per square foot. Pan for Glover tower is 4-inch thick and weighs forty pounds per square foot. All seams and joints are burned or joined with the hydrogen flame, making a solid lead joint. Special acid resisting brick is used in the towers. E. H. Benson, of Weymouth, Mass., plans and looks after the construction of the plant, and will manage on completion.

J. F. Force, president of the Bob Tail Mines Co., has bought six claims between Jay & Kelvin, on which F. D. Adams and a force of miners have been doing development work. There are two ledges, carrying gold values. The ore assays \$25 per ton. Development work will be continued.

The Columbia C. Co., of St. Louis, has bought sixteen copper claims in Globe district, and, it is reported, will erect a 50-ton concentrating plant and install a gas-engine hoisting engine. A shaft is down 254 feet, with levels at 100 and 200 feet, the shafts and drifts being in sulphide ore averaging about 8% in copper.

The Globe-Boston C. Co., owner of the Gallory, the Aztec and Pinal and several other claims and a millsite, near Globe, has sunk a double-compartment shaft 175 feet and has let a contract to sink to 400 feet.

GRAHAM COUNTY.

A strike is reported to have been made in the Harrison tunnel of the Shannon mine at Clifton. An ore body has been found which runs 10.54% of copper for the last 30 feet of tunnel driven.

MOHAVE COUNTY.

F. W. Zorn and L. A. Dickinson, of the Great West mine, near Kingman are arranging for the installation of a small milling plant. The mine shows large ore bodies and values with depth.

The Railroad mine, near Kingman, has been bought by the Gold Road Co. from J. H. Hooper, H. W. Kemper, L. Leutinger and J. F. Withers.

The Schee Brothers, of Santa Monica, Cal., who own the Pinkham mine, at Floride, say the mine has reached a depth of over 200 feet and is looking very well in the bottom.

C. L. Constant, of Kingman, says of the mine on the Big Sandy that the showing of tin on the property seems good. The ore occurs in a copper vein, but the outcrop is somewhat broken up. The mine has been bonded.

PINAL COUNTY.

A half interest in eight claims located in the San Carlos segregated "Strip," near Florence, owned by W. J. Parks, F. Richardson and associates, has been sold to C. B. Booth of Los Angeles, Cal., who holds a bond on the remaining half interest. It is the intention of Mr. Booth to develop the claims. W. J. Parks is Supt.

SANTA CRUZ COUNTY.

J. D. Burgess of Tucson is arranging to erect a 60-ton smelter at Calabassas, to reduce ores from his Montrose mine in the Josephine canyon, Santa Rita mountains, and to do custom smelting.

F. B. Wilson of New York, president of the Arizona G. & C. Co., says that the company proposes to get the smelter at Patagonia in operation at the earliest possible time, to receive ores from their mines and other nearby properties. G. W. Crowe is manager at Patagonia.

YAVAPAI COUNTY.

The Montana-Arizona C. M. Co., of which R. A. Bell of Helena, Mont., is

president and C. R. Lloyd of Butte, Mont., vice-president, is incorporated, capital \$250,000, to operate twenty-three mining claims in the Eureka mining district, near Hillsdale.

The Union G. M. Co., owning the Union and Liberty mines in the Crowned King Basin, near Prescott, is developing, with J. Luke as superintendent. A tunnel is being run on the vein, which is now in 700 feet. The ore carries good values in gold, silver and copper.

CALIFORNIA.

AMADOR COUNTY.

Sinking continues at the Lincoln mine, at Sutter Creek, and the shaft is now in slate containing numerous quartz stringers. The appearance of the formation, Supt. Voorheis thinks, is very encouraging.

The George Upton mine, near Plymouth, is putting up a 10-stamp mill. A boarding house has recently been erected.

Another very rich spot has been encountered in the Oneida mine, at Jackson, and considerable quantities of quartz showing visible gold taken out.

The Price mine, north of Plymouth, has been sold to a new company. Mr. Durst will be the new Supt.

At the Fremont Con. mine, at Drytown, a connection has been made from the Fremont shaft to the old Gover shaft and a large body of good grade ore developed. A contract has been made with the Standard Electric Co. for 500 electrical H. P. to operate the machinery of the plant. A 60-stamp mill will be erected. C. E. Furrington is Supt.

CALAVERAS COUNTY.

The Goat Ranch mine, near Keystone, has been bonded by A. S. Poole to some parties who have sunk 100 feet on the ledge and crosscut 26 feet. From the surface down the rock, which carries gold and copper, increases in richness. It is said the gold values now are about \$35 or \$40 to the ton and the copper about \$15.

The Wilbur-Womble mine, near San Andreas, has suspended operations pending the installation of new machinery. The 6-stamp mill is to be increased to eighteen stamps and steam power for the mill and hoist will be put in.

The Wright & Lane M. Co. is operating the Alta mine, near Copperopolis. The dam on Little John creek has been completed, making a 100-acre reservoir, and 7½ miles of 8-inch iron pipe has been laid to the mine to supply the batteries. The dam is 60 feet wide on the base and tapering to 20 feet at the top. It is 324 feet in length on top and about 100 feet on the bottom, with an average height of 35 feet, the pipe opening 30 feet below the top. The 40-stamp mill is completed and will be run by electric power supplied by the Stanislaus Power & Water Co. In the old 10-stamp mill some 55,000 tons of ore have already been crushed with good returns. In the mine so far neither hanging or foot wall have been discovered, though at a depth of 200 feet it has been crosscut for a distance of 600 feet, all in vein matter, which shows good prospects. The mine will be worked by open cuts from the surface, dropping the ore to the tunnel at a depth of 200 feet, whence it will be run in cars to the mill. In this way all necessity for timbering will be obviated.

Mr. Bates of Duluth, Minn., has bought the group known as the Beatrice, 2 miles west of Murphys, and has placed a superintendent in charge of the mine, who will operate it. There is a 10-stamp mill on the property.

It is reported that the Lightner Co. is working its sulphurets in its new chlorination plant in such a manner as to save 97% of all the values worked. The new electric power tramway from the mill to the chlorination plant—1500 feet—carries 1600 pounds of sulphurets every fifteen minutes in buckets, each holding 100 pounds.

At the annual meeting of the company, held in Stockton, the old Board of Directors were re-elected. C. M. Jackson of Stockton is president, B. F. Wellington, Jr., secretary and A. Chalmers superintendent at Angels.

EL DORADO COUNTY.

A 60 A. P. boiler and engine from the Union mine and a 40 H. P. hoist from the Pocahontas will be installed on the Old Pacific mine, at Forest Home, near Placerville.

The Mammoth Bar and other mines on the American river have shut down until next summer.

F. S. Chadbourne has bought of the Larned estate, for Pennsylvania people, the slate quarries at Placerville, formerly leased and operated by the Placerville Slate Co., and will proceed at once to operate them on a large scale. A compressed air plant will be installed. The use of slate on the Pacific coast is increasing.

INYO COUNTY.

Willis & Roeper have shipped twenty-three tons of ore from the Green Monster mine, near Independence. A large body of shipping ore has been struck in the main tunnel.

KERN COUNTY.

(Special Correspondence).—The Democrat mining district, formed over twenty odd years ago, gives promise of a revival of life. Considerable development work has been done in the district in the past two years. The Mineral Spring mine, owned by O. W. Meyers, has had a new steam power arrastra put up on it, but has been found unsatisfactory and is now shut down for remodeling, so as to use a cyanide solution while the crushing is being done.

Development work is being done at the Gem mine; the 2-stamp mill at the upper tunnel is running continuously. The tunnel is in about 700 feet on the ledge; it was started to drain the old shaft 350 feet in from the mouth, but a blend shoot of ore 45 feet long, averaging 2 feet wide, was struck before reaching the old shaft. At the foot of the shaft the first worked shoot, about 40 feet long at the surface, extended out to 95 feet at the tunnel level, running from 20 inches to 7 feet in width. The lower level has been run to tap the lead 350 feet below the upper level. It will require about 600 feet of a crosscut, of which 290 feet is built. The rock is a blue granite, and drilling by hand is necessarily slow. The ore thus far milled has paid from \$12 to \$70 per ton free milling, and about 400 tons of tailings which they are saving assay from \$7 to \$42 per ton, some of the ore being very base. The owners propose to cyanide the tailings in the future.

Kern, Nov. 6.

The Mammoth Coal Co. of Randsburg has contracted to have a 3000 H. P. electric plant installed at the Mammoth coal mines, near Randsburg, to furnish power for the mills and light for Randsburg, Mojave and Barstow.

MONO COUNTY.

S. Tokio of Bodie says that a 3-foot ledge of rich ore has been opened up on his Mt. Grant claim. He proposes to let a contract for a 400-foot tunnel that will tap the ledge 350 feet deep.

NEVADA COUNTY.

E. Tilley has decided to erect a new 5-stamp mill on the Midnight mine, at Nevada City. Provision is to be made so that five additional stamps can be added later.

C. Belden and associates, who own the Gold Bank mine near Mayburt, intend to erect a 3-stamp mill there shortly.

Supt. Rosenthal of the Pine Hill mine, in the Lime Kiln district, at Wolf, says that the ledge has been struck in the hanging wall at the 400-foot level, showing a good body of ore. The projected smelter is being arranged for early installation.

The old Talbot mine in Willow valley, which is owned by G. W. Welch of San Francisco, has been bonded to a company for \$20,000, and it is understood that they will commence work soon developing the claim.

PLACER COUNTY.

It is reported that the Ralston Divide G. M. Co. is about to abandon its mine in Long canyon and close down permanently.

A strike of rich quartz has been made in Buncie canyon, near Colfax, on the Red Bird and Buena Vista claims, owned by H. Newton of Lincoln and G. A. A. Tubbs of San Francisco. The ledge is from 4 to 10 feet in width. A tunnel has been run 60 feet on the ledge.

The Cedar Creek drift gravel mine, near Shady Run, is reported sold to the Tacoma M. Co. The company, it is said, will immediately commence the work of developing the mine. T. A. Rodger is Supt.

PLUMAS COUNTY.

The Reno owners of the Last Chance mine, near Beckwith, are putting a whim in place and will sink a shaft 200 feet deep. The present 200-foot incline reaches to a perpendicular depth of only 80 feet. It is claimed that the ledge is 8 feet wide and carries gold, silver and copper, the last named predominating.

At the Nelson mine, near Nelson Point, the tunnel is now in 600 feet. The gravel is reported to be paying about 90 cents to the carload, much of the gold being coarse. A new tunnel will be started by which it is expected to bottom the channel.

SAN LUIS OBISPO COUNTY.

At Adelaide the Karl Quicksilver M. Co. employs sixty men. A sixty-ton furnace is in operation and is turning out quicksilver. The Gould, the Bell and the Trafton mines will be producing quicksilver next year.

Cinnabar is being found in the neigh-

borhood of Adelaide, and prospectors are busy.

SISKIYOU COUNTY.

D. McCarthy, who had a bond on a group of sixteen copper claims near the Joe West country, has rebonded the group to a Hartford, Conn., company at \$170,000.

Captain De Lamar is reported to have bonded the McVey copper claims, at the head of Joe creek, in the Siskiyou mountains, near the State line, from W. H. Hamilton, S. McVey, L. F. Cooper and G. B. Adams of Crescent City at the price of \$200,000; \$10,000 down. The mine is located at an altitude of from 4500 to 5100 feet and is best reached from Jacksonville, in Oregon.

The Siskiyou mine, about 16 miles below Happy Camp, on the Klamath river, will be run with a full force this winter.

The Van Brunt, near Happy Camp, is ready for a big run, having lately completed a 500-foot bedrock tunnel, bottoming the deeper back channel.

Wood & Cuddihy will operate the Portuguese mine, near Bailey's, and have several men at work getting ready for the winter run.

J. O. Welch has sold his French creek placer mines, near Etna, to Pittsburg, Pa., people, represented by S. S. Stahl. Mr. Welch, who has been made superintendent, says that work will be commenced at once to survey for a ditch to take water from the headwaters of French creek. The ditch will be 9 feet wide, 5 feet deep and 4½ feet in width on the bottom and will supply water for eight giants, which it is proposed to operate. About fifty men will be worked all winter. The company has five lakes which will be used as reservoirs to store water for summer use.

TRINITY COUNTY.

A strike is reported in the Boulders mine at Carrville, the ore running from \$100 to \$300 per ton. G. L. Carr is one of the principal owners of the mine.

L. Greenebaume of San Francisco and C. A. Malon and S. Weil are prospecting 2600 acres of placer ground in Hay Fork, on which they propose to install a hydraulic plant. Black sand has been found on the land in considerable quantities, carrying high values in platinum, iridium and gold.

The pay shoot has been struck in the lower tunnel works of the Brown Bear mine at Deadwood. The tunnel is in 5000 feet. The shoot was struck in an upraise from the tunnel at a point about 700 feet from the surface and about 200 feet below the upper workings. The ledge carries the same high values as it did in the upper workings. When the ore body is opened by the advance of the tunnel heading it will give 360 feet of backs on the pay shoot and a depth of about 900 feet on the mine.

The mining town of Cinnabar was destroyed by fire on Nov. 9. Of the mining camp and plant the hoisting works only escaped, and that is damaged. The loss will approximate \$75,000. The town was built about the Altoona quicksilver mine. Several months ago all work was stopped at the mine, the ore having been extracted from the upper workings.

TUOLUMNE COUNTY.

The French company which formerly operated the Bown mine, near Tuttle-town, owned by Boye & Miner, under bond, but allowed the bond to elapse, are proposing to take another bond on the mine. The company put up a hoist and a 20-stamp mill on the mine. The mill has since been sold.

A rich strike has been made in the Jumper mine at Stent in crosscutting from the 200-foot level south of the main shaft. It is claimed to be an entirely new ore body parallel to the old vein. The vein is 12 feet in width and estimated at \$40 per ton.

At the New Era, near Carters, a new shaft has been sunk 200 feet, where the ledge shows 6 feet wide. Heinz, Carter, Wiltsee & Holland are the owners, the latter being superintendent.

All of the stock of the Soulsby Con. G. M. Co., which operates the Soulsby mine, at Soulsbyville, has been bonded to H. J. Sisty of San Francisco for eighteen months at \$150,000. The bond provides that Mr. Sisty shall have immediate possession of the property.

COLORADO.

FREMONT COUNTY.

(Special Correspondence).—It is announced at the Rocky Mountain smelter that the plant is expected to blow in within the next few weeks. Additional equipment has been provided to enable handling of all classes of ore. It now includes roasters for sulphide ores, a reverberatory furnace for the fine dust and a well-equipped refinery.

The Union plant of the United States Reduction & Refining Co. is expected to resume operations by December 1, with a

capacity of 400 tons of ore daily. During the temporary closed down period many changes have been made in the mill, which relate to methods of preparing the pulp for chlorination and the concentration of the tailings. At present the sampling department is running and handling about 200 tons a day, the pulp being placed on the bedding floor ready for the reduction plant. The ore supply for this plant comes from Cripple Creek district. Supt. J. Q. MacDonald states that the ores from that district are becoming higher in sulphur than formerly.

The Metallic plant of the same company is at present idle, though its 600,000 tons of tailings, which have accumulated within the last seven years, are being concentrated. There are twenty tables that make a coarse product, the latter being reconcentrated by five finer tables. The product resulting from concentrating over one hundred tons into one ton is shipped to the smelter.

The Dorcas pneumatic cyanide plant handled 2500 tons of ore during October, the average content being \$30 per ton.

Florence, Nov. 7.

The Sunset M. Co. has been incorporated and is operating in Copper gulch, near Florence. Copper ore has been encountered, assaying 12%, six ounces in silver and \$8 in gold. A crosscut will be driven to open up another body of ore. C. O. Rice is president, B. C. Watkins secretary and treasurer, and L. B. Paul general manager, with office at Pueblo.

The Portland Cement Co., the stockholders of which are principally Denver people, and the directors of the Colorado Co., operating near Florence, have combined and located the factory on the main line of the Denver & Rio Grande Railroad near Florence. The capacity of the plant will be 800 barrels per day, or 320,000 pounds. It will cost about \$250,000, and the factory will be turning out the finished product about July 1 next. Work upon the excavation for the foundation of the plant has commenced. The board of directors consists of M. D. Thatcher, C. E. Gast, A. Moore, J. B. Grant, W. F. Geddes and W. H. James of Denver.

GILPIN COUNTY.

(Special Correspondence).—The Running lode is being worked by the Gower Syndicate through a 625-foot shaft, there being eight levels in ore, from which shipments amounting to 100 to 200 tons a month are made. The ores are lead and iron sulphide, which are said to average \$100 per ton in gold and lead.

The Eagle mill, belonging to F. C. Came, is in charge of W. H. Coffin and is treating fifty to sixty tons a day in custom work. Plates and concentrators are used.

The Buckley mine, on Gunnell hill, owned by Lake Superior people, is being further developed, two drifts being run on the 500-foot level in opposite directions from the 600-foot shaft. J. H. Hooper is manager.

The Ontario-Colorado G. M. Co., in charge of H. C. Eastman, have a 665-foot shaft, 2000 feet of drifting on the vein and about 300 feet of winze work. The shaft house, 100x34 feet, includes blacksmith shop, machine shop, compressor room, as well as boiler and engine room and light plant. Considerable development is in progress and regular shipments are made to the mills and smelters. The company's holdings comprise about 3000 feet along the strike of the vein. The ores carry gold, copper, silver and lead.

A stamp and concentrating mill is to be erected on the property of the Bonanza & Union T. & M. Co. in Chase gulch, near Central City, whose workings are through a 1450-foot tunnel which goes into Maryland mountain. The construction will be in charge of S. A. Rank, with J. A. Gilmore in charge of the mine.

Central City, Nov. 1.

There were 513 stamps—rapid and slow drop—going in Gilpin county during October, all of them situated in Black Hawk, Perigo and at Gilpin. This number will be added to during the present month by the 25-stamp mill, rapid drop pattern, of the Avon G. M. & M. Co. in Nevada gulch, and the 15-stamp slow drop mill of the Booster M. Co. at Apex, in Pine district. Three new mills are to be erected, namely, the Gregory-Buell Con., in Central City, a 45-stamp rapid drop; a 25-stamp mill and concentrator in Chase gulch, and a concentration mill in Black Hawk for the Grand Central G. M. Co., which will have a capacity of from 50 to 100 tons.

GUNNISON COUNTY.

A strike is reported from the Silent Friend property, in the Pitkin district, by the leasers, E. Wiley and J. D. Parsons, Jr. The Silent Friend was recently bought from D. T. Sapp of Denver by the Reynolds syndicate operating at Pitkin. Wiley & Parsons are working under a lease from the old owners. The present owners have started a tunnel into Silent

Friend mountain to develop the ore bodies in depth.

It is reported that the Colorado Fuel & Iron Co. are negotiating to buy the deposits of manganese iron ore on the Cebollo river. The deposits form two immense mountains of iron ore that can be mined economically, but have remained undeveloped by reason of remoteness from railroad. B. W. Lewis of Gunnison is the owner.

The Gold Pick M. & M. Co. has been incorporated in Wyoming, to operate mines on Willow creek, 4 miles southwest of Vulcan, which is the local office. Ore from the claims gives as high as \$100 gold, 250 ounces silver and 50% lead. The claims are to be developed by a tunnel which will tap the ore bodies at considerable depth.

HINSDALE COUNTY.

A consolidation has been effected of the two companies formerly operating the California mine and Ocean Wave mill at Lake City. The California crosscut tunnel, which has been commenced, will be continued until the vein is reached, an estimated distance of 500 feet.

LAKE COUNTY.

Some important new work is being done by lessees on the old Denver City Con. property at Leadville. While the lessees have been taking out some zinc sulphide deposits and making occasional shipments during the year, they have now gone to systematic mining and development for richer ore bodies, and have already run across several feet of good iron ore, from which shipments have been commenced.

From the dumps of the old Gallagher shaft of the Mikado mine at Leadville, H. Dyatt is shipping 100 tons a day of dry siliceous ore that pays a nice profit to each ton. There are thousands of tons in this dump and a number of other big dumps are being sorted over in a similar manner.

It is reported that the Rialto M. Co., operating at Leadville, will resume operations. Managing Director G. L. Havens of Denver, it is said, will take personal charge of the work. The group consists of several claims lying in the vicinity of the A. M. W. and Greenback, in Graham park, and when work at the 1200-foot level ceased the ore shoot had been partially exposed.

LAS ANIMAS COUNTY.

A party of prospectors have been operating in the mountains west of Stonewall, and it has become public that a rich find has been made. The ore that has been taken out is said to average over \$100 per ton, and there is said to be plenty of it. It is understood that Cripple Creek mining men are behind the prospectors.

OURAY COUNTY.

The Caroline M. Co., operating the Virginus and other mines at Ouray, through the Revenue tunnel, is employing 200 men, a smaller force than for years. Development work is being done rather than stopping out ore. The Revenue mill has depended largely on water power, which is short this year, and may account for the reduced number of employees. To overcome this a new power plant is being built in Ouray that will be equipped with boilers, engines and dynamos large enough to supply 10,000 electric H. P., coal being used to generate the power. Numbers of mines during the past summer have put in compressed air and electric drill plants, and the cost of packing or hauling coal up to the mines, usually situated near timber line, is being found too great to permit working low-grade positions. Water rights being unavailable, coal furnishes the next cheapest power. To supply this the San Juan electric railway has been organized by Colorado Springs people, who have taken an option on some coal land near Ouray. As soon as a survey and estimates are made the company will build a power house near Ouray and transmit power to the mines by wire.

The St. Paul mine at Red mountain, Ouray, W. F. De Camp of Lake City, manager, has been closed down.

The Silver Link copper mine, near Ouray, shipped several cars of copper ore during the summer, which returned over 50% copper and several hundred ounces in silver to the ton. F. Seaburg, manager, will sink the shaft 100 feet deeper.

SAGUACHE COUNTY.

The Brock M. Co., operating a mine near Villa Grove, has so far this season marketed seven carloads of ore which smelted from \$34 to \$74 a ton in gold, copper, lead and silver. The shaft is 145 feet deep. Work will at once be commenced on a 650-foot tunnel.

SAN JUAN COUNTY.

Nine new mills, to be erected by as many different mining companies, are already planned for construction in the vicinity of Silverton as early in the spring as it is possible to go to work. Some of these will be erected by companies controlling mines

that are already large producers, while others will be built by companies that expect to become large producers next season.

The mill of the Contention M. & M. Co., operating the North Star at Silverton, is nearly complete and about ready to begin operations. The wire cables for the tram line are being put in place to connect the mine and mill before the weather gets bad.

SUMMIT COUNTY.

The Wellington M. & L. Co. has started operations on Mineral hill, at Breckenridge. The company controls several claims, on the south slope of the hill, which are opened by a tunnel in 800 feet. R. W. Foote is president and manager of the company and J. T. Hogan is attorney and secretary.

TELLER COUNTY.

The Elktion dump, containing 180,000 tons of mineral-bearing rock, has been bought by the Murrill G. M. Co., of Colorado Springs, on a basis of \$1.50 per ton, involving \$270,000. The Murrill G. M. Co. has bought eleven lots near the Elktion and it will build a tram road from the dump.

A. Pierce and associates have leased the south end of the Black Belle mine at Cripple Creek, and have ore in sight in a drift at the bottom of an 80-foot shaft that runs upward of \$40 in gold to the ton.

The Practical G. M. Co. has resumed work on the Pauper claim, south of Altman. J. McElwee, Supt. A contract has been let for 50 feet of drifting at a depth of 250 feet. The company is installing a larger hoist that will be driven by electricity.

A strike has been made on the Lone Star, at Cripple Creek, owned by the Anacoda Co., by J. H. Brown. At a depth of 30 feet, 18 inches of quartz is now being drifted on that runs better than \$100 a ton. The same shoot has been opened up by other lessees for a distance of about 400 feet from the first discovery.

IDAHO.

BLAINE COUNTY.

F. H. Parsons and T. Brennan of Hailey have bought a three-fourths interest in the Carey-Hampton group of claims above Ketchum for \$15,000.

D. B. Huntley, of Silver City, has sold his bond on the Idahoan group at Hailey to C. J. Sherry. Two veins have been exposed by the workings. One is of 2 feet of carbonates, the other 10 inches of shipping ore. Mr. Sherry says that he intends to keep at work on the claims.

ELMORE COUNTY.

E. W. Duncan is president, A. L. Morris vice-president and manager, and W. P. Cooper secretary and treasurer of the Neal G. M. & M. Co., which has been incorporated at Salt Lake City, Utah, with capital of \$30,000. It owns the Badger and North Star claims.

IDAHO COUNTY.

G. Rea of the Gold Crown Co.'s mine on Snake river, near the mouth of the Grande Ronde, says the tunnel is in 150 feet and has developed ore carrying gold and silver. It is expected to soon strike the copper ore seam opened in the upper workings, from which the company is getting out ore for shipment.

W. H. Dewey of Nampa and T. N. Barnsdall and S. B. Longfellow of Pittsburgh, Pa., have made the final payment of \$100,000 on the fourteen Thunder mountain claims which they had bonded.

W. H. Dewey has ordered of the Allis-Chalmers Co. a 100-stamp mill for his Thunder Mountain mine. The weight of each stamp is 1050 pounds. Three boilers and a 300 H. P. engine will be included in the plant. It will be taken in to the mine via Boise next spring.

KOOTENAI COUNTY.

The development of the Weber mine, near Lakeview, on Lake Pend d'Oreille, is opening some high-grade silver ore, which is being carefully sorted for shipment. It will run about 200 or 250 ounces silver, besides good gold values. About eighteen men are employed. Five of them are taking out ore, which is being shipped, and is said to average forty ounces in silver, with a little gold. The wagon road transportation at Hope is about \$2.50 per ton and the freight and treatment rate is \$7.50. Supt. McJimpsey says the mine is more than paying its operating costs.

The Gold Hill M. Co., owning the Monitor and Merrimac claims, near Coeur d'Alene, has built cabins and is driving tunnel on the Monitor. The company has sold a sixteenth interest in this claim to J. Haybault of Rossland, B. C., for \$1000.

SHOSHONE COUNTY.

The Granite M. Co. has been incorporated in Spokane, Wash., to reopen the old Granite mine, near Wallace. This property produced a net profit of \$600,000 before it was closed down in 1892. The office of the company is at Spokane and

its capital \$500,000. The incorporators are J. P. Keane, C. P. Chamberlain, W. S. Norman, J. Porteous and H. B. Nichols, all of Spokane, Wash.

An elevator plant on East Eagle creek near Murray, is being constructed. The water supply will have a pressure of 30 feet where work is to be commenced. The company which will operate is composed of the same people as the Coeur d'Alene M. Co. of Murray. It owns a large area of placer ground.

MONTANA.

CASCADE COUNTY.

A large body of free-milling ore, averaging from \$7 to \$10 per ton, has been struck in the Empire mine, at Empire, by the Superior & Montana Dev. Co. The plans of S. H. Brady, the manager, are to develop it so as to put a large amount of ore in sight before the mill is started.

FERGUS COUNTY.

(Special Correspondence).—The Whisk Gulch cyanide mill ran through 4200 ton during October and cleaned up \$2200. The ore carries some quicksilver, so the all the zinc slimes are retorted before melting. The Spotted Horse 20-stamp mill has closed down for the winter. C. J. Durell, the Supt., states that the mine development during the winter will be to open up the eighth and ninth levels, which will require about 1000 feet of drifting and sinking. A winze, equipped with an underground hoist, will be sunk in addition to the shaft, so that each level can be started in three places at once. As the ore seems changing, with tellurides appearing, it is believed a roasting plant will be required before the mill starts again.

The New Year G. M. Co.'s ropeway connecting the mine with the mill has been completed. A. B. Plumb, Supt. of the Gilt Edge mill, is operating an experimental roasting plant, testing the so-called "black ore," which has so far resisted reduction.

Maiden, Nov. 2.

The Ursus mine at North Moccasin, cyanide property, has been bonded to F. Flanagan for \$16,000 by G. B. Stuart and D. J. Burr, the discoverers and owners of the property, for eighteen months. The agreement requires Mr. Flanagan to thoroughly prospect and develop the property.

C. H. Williams and J. Wocasek have bonded a silver mining claim at New Year to Anderson Bros. of White Sulphur Springs at \$10,000 for one year, with a agreement by Anderson Bros. to work continuously on the property and develop it thoroughly.

J. Giroux is conducting development work on prospects opened up by him many years ago near Lewiston. He has taken out cyaniding ore which assays from \$2.6 to \$5.

The second shipment of bullion from the new King-Barnes mill, at Maiden, is valued at \$4500.

Development work has been done on the Banner mines, near New Year, and the operators, Akerley Bros., have uncovered a large body of cyaniding ore which assays from \$3 to \$5 gold per ton. A 70-foot crosscut has been made in solid ore which is situated in the lime and porphyry contact. J. L. Harmon of New Year has bonded his interests to the present operators for one year.

GRANITE COUNTY.

J. C. Duffey has incorporated the New York & Montana Con. M. & M. Co., its principal stockholders being Mr. Duffey, W. E. Deeney, G. Nissem, J. O'Meara and Mrs. McDonald of Butte. The property of the company are gold mines located in the Red Lion district, near Phillipsburg.

U. F. Hughes, who is operating mine on Gold creek, near Phillipsburg, is constructing a ditch to convey water to the placer ground. He says two other long ditches are also being constructed to bring water to the placer mines of the district.

LEWIS AND CLARKE COUNTY.

J. A. Rowand of Helena has bought the Winscott mine, near Helena.

W. A. Clark has bonded the Terr group at Blackfoot City, and has appointed M. Buckley superintendent to develop the property. The shaft is down 100 feet in ore carrying gold, silver and copper. It is intended to sink the shaft 20 feet deeper.

J. Beach, J. H. Wilson, C. L. Freericks and F. M. Keiser of Lake Lindner Mich., stockholders of the Columbia G. M. & M. Co., have been examining the Columbia mines at York. It is proposed to increase the capacity of the stamp mill at the mine from ten to thirty and possibly fifty stamps. A number of other improvements, including an air-compressing plant, are contemplated.

W. L. Brown of London, England, has bonded twenty-four quartz claims and 10 acres of placer ground in the Seven-U Pete district, near Stemple, for over

250,000. It is claimed that the group has upwards of 150,000 tons of ore in sight that will average about \$10 in gold, with some silver. It includes the Donnelly & Merritt properties, Hogan & Johnson claims, Johnson & Pierson claims and W. F. Howe properties. There is over 1000 feet of work done on the various claims. The stated plans of the new company contemplate the erection of a mill to treat 250 tons of ore a day. It will be a combination of stamps, concentration and cyanide treatment.

MISSOULA COUNTY.

The DeBorgia Copper M. Co. has been incorporated with office in Mullan, Idaho, capital \$100,000; by J. H. Wade and W. D. Greenough of Mullan, Idaho, T. S. Hogan and C. Hendrickson of DeBorgia, T. J. Warren of Butte, T. L. Greenough of Missoula and P. Larson of Helena; to develop a group of copper claims near DeBorgia.

The Oro Monarch Con. Mines has been incorporated, with Wallace, Idaho, as its principal office, capital \$2,500,000, by C. A. Wing of Spokane, Wash., J. E. Wing of DeBorgia, D. A. McKenzie, J. H. Taylor and H. A. Moore of Wallace, Idaho, to mine near DeBorgia.

Development work has been resumed at the House claims near Clifton, which had been closed for the installment of new machinery. At a depth of 300 feet ore bodies have been discovered. J. A. Porter is manager.

SILVER BOW COUNTY.

The Boston & Montana mine is installing in the 1200-foot level of the Leonard mine a pump which will lift 1000 gallons of water a minute to the surface. All of the company's mines at Meaderville are drained through this shaft.

NEVADA.

ELKO COUNTY.

It is reported that a rich vein of ore has been struck on Bull Run mountain, about 8 miles from Mountain City. The strike is about 4 miles above the Murphy mine, upon which a mill is now running.

ESMERALDA COUNTY.

The Consolidated Esmeralda Mines Co. of Hawthorne, Nevada, has been incorporated to operate the Lapanta and Palmico properties, and work will soon be commenced. Water will be brought to the mines from Cottonwood canyon and a cyanide mill plant erected. These mines have yielded over \$500,000. S. A. Knapp and R. J. Laws are the principal stockholders in these two mines.

LINCOLN COUNTY.

The Hillside C. M. Co. of Nevada has been incorporated to operate the Hillside mine at Bristol, and is closely connected with the Bristol C. M. Co., being under the same management. W. Gelder of Denver, Colo., is president and general manager of both companies. J. E. Gelder of Pioche is treasurer and local business manager. The ores from both properties will be treated by the smelter at Pioche, which is rapidly nearing completion. H. Klingender is Supt.

NYE COUNTY.

Reports from the new strike south of Butler City, Tonopah district, say an 18-inch ledge of \$200 ore has been developed and extends practically the length of three or four claims, and in places carries a seam of talc along one wall that assays as high as \$1400 per ton. Several leases have been let on it.

The Liberty Springs district, near Tonopah, is attracting the attention of a number of prospectors. Several large ledges of low-grade free milling ore are known to exist there, and lead carbonate ore, running well in both gold and silver, is also being found.

The last smelter returns received at the Tonopah mines was of date November 2. For the five days preceding, from October 28th to November 2nd inclusive, the net returns amounted to \$40,562.14, as follows: October 28th, \$6055.45; October 29th, \$15,265.78; October 30th, \$6595.94; November 2nd, \$12,645.07. This is an average of \$8112.42 per day for the five days. The net returns for the month of November will possibly exceed \$250,000, and this will only represent about 25% of the actual production of the camp. These net returns are the sums the mine owners receive after freight and treatment charges are deducted. The largest individual returns for these five days were as follows: To Brounger Brothers, Lease No. 36, \$8535.26; to the Tonopah Co., for ore from Clark shaft, \$5648.87; to Sinclair & Golden, Lease No. 50, \$5210.05; to Beauchamp, Tamblin & Co., Lease No. 32, \$3293.58. There were a number of returns from \$1000 up. The highest returns were 2860 pounds from lease 27, owned by Peters & Bass, gave a return of 247 ounces in silver and 62.35 ounces in gold, a total value of \$1350 per ton; 5820 pounds from lease No. 115, owned by McDonald & Co., gave a return of 455 ounces

in silver and 5.90 ounces in gold, or a value of \$363 per ton after the deductions. There were a number of returns of over \$200 per ton.

WASHOE COUNTY.

J. K. Miller and associates of Denver, Colo., have bonded 100 acres of copper land in the Peavine district, near Reno, at \$75,000. The present development consists of a 500-foot tunnel driven to open a copper ledge which thirty years ago is said to have produced large quantities of copper.

Morath Bros., Middah & Arnold of Cripple Creek, Colo., have bonded eighty acres of ground at Reno adjoining the Reno Star mine at Reno at \$60,000.

Ground has been broken for the Reno Star mill at Wedekind City, and it is intended to have the mill crushing ore by Jan. 1. The capacity at first will be twenty tons daily, but additional rolls can be added.

From the first 100 tons of ore plowed up by W. C. Williams from the surface of his claim at Olinghouse he has received \$3659 from the mint.

NEW MEXICO.

Work is being done on the White Oak and General Lawton iron mines, near Santa Rita, owned by Roach & Ashton of Silver City. The ore is found in practically inexhaustible quantities, and is a high-grade bessemer ore.

GRANT COUNTY.

W. H. Newcomb has resumed work on the St. Louis mine at Burros. The old shaft, down over 500 feet, is to be reopened and a new shaft will also be sunk on the Colwell to connect with the old workings.

The Sampson mine at Burros is having fifteen tons of ore treated daily at the mill at White Signal. Fifteen men are at work in the mine.

The Gem Turquoise & Copper Co. at Burros has put fifteen men to work upon its turquoise and copper properties and is making shipments of gems.

J. R. McKinnie, in the Central mining district, near Burros, has sold ninety-five acres of copper-bearing land for \$100,000 to the Savage G. & C. Co. of Colorado Springs, Colo., which also owns the Hanover Annex and Rattler lodes at Hanover. Mr. McKinnie is Supt.

LINCOLN COUNTY.

S. S. Doak, Supt. Iowa & New Mexico M. & M. Co.'s mine at Schelerville, says that the company contemplates putting in air drills, compressors and steam hoist at the Schelerville group, and that as soon as such equipment can be placed the shaft of the Homestake will be put down several hundred feet. Good ore and a well defined vein of copper, lead and silver now shows up at a depth of 150 feet, and it is the company's intention to hurry development until the mine is made a producer.

SOCORRO COUNTY.

The Mogollon G. & C. M. Co., which owns properties in Mogollon district, has begun active development work.

At the Last Chance at Mogollon the cyanide process will be installed. Development work is being done in the mine. E. Craig is Supt.

The Silver Bar mine at Cooney, owned by Colorado people, H. C. McGreary manager, is employing fifty men. A system of concentration is being tested, known as the "slum tables." It is claimed to save over 90% of the values in the ore. The development work in the mine at present is sinking from the 400-foot level to the 560-foot level.

OKLAHOMA.

It is reported that a rich find of copper and gold has been made in the mountains in Woodward and Wood counties. People are said to be stampeding to the locality of the strike.

OREGON.

BAKER COUNTY.

The Whitaker group, near Cornucopia, has been sold for \$20,000 to the Single Standard M. & M. Co. of Colorado, E. S. Tice of Denver, Colo., president and general manager and M. Baroch of Denver, Colo., secretary and treasurer. The mine has been developed by about 1000 feet of tunnel and shaft work, showing an ore vein 18 to 48 inches in width, which carries average values of \$10 to the ton. A two years' run of ore for a 10-stamp mill is said to be blocked out in the mine. It is the purpose of the company to at once erect a mill and concentrators on the property and an electric power plant to operate them.

J. E. Farris, a large owner in the Quebec mine, near Alamo, has sold his interest to J. W. Carr and associates. Mr. Farris will retire as director.

JACKSON COUNTY.

The Gold Chloride mine still holds its value in the ore. The depth in the main

tunnel is 50 feet, with 3 feet of milling ore. Mears, Landreth & Co. of Gold Hill, the owners, have opened up the vein in four different places and have found it as wide and rich as in the main tunnel. Eleven tons lately netted \$30 per ton.

JOSEPHINE COUNTY.

The Lyttle copper mine, near Waldo, has been bought by Capt. Draper, manager of the Waldo copper mine. The ledge is 22 feet in width and 300 feet of tunneling has been done on the property.

The Williamsburg M. Co. has been incorporated, capital \$500,000, by F. E. Forbes, T. J. McClum, R. G. Smith and L. A. Heberle of Grants Pass.

The Dry Diggings hydraulic mines, near Grants Pass, have been sold by H. A. Corliss to C. W. Ament of Chicago for \$25,000.

The Lyttle copper mines, near Waldo, have been sold by J. Lyttle to T. W. M. Draper of San Francisco, the owner of the Waldo copper mines and smelter, in the same district. The price paid was \$15,000.

LANE COUNTY.

The Rainbow M. & S. Co. has been incorporated, capital \$1,000,000, by J. Effert, W. S. Lamb and C. G. Steffen of Illinois. Roseburg is the principal place of business.

UMATILLA COUNTY.

A dredger is under construction in the John Day country, south of Ukiah, which will be finished some time next year. T. Pomeroy is superintendent of construction. It is expected to work 8 miles of channel bed which has been prospected by shaft.

SOUTH DAKOTA.

LAWRENCE COUNTY.

The Spearfish Co., has cleared away the debris of the fire and commenced the erection of a new cyanide plant. The company expects to have the new mill ready for operation within three months.

The Bertha mine, near Lead, operated under lease by P. Oberto, is shipping fifty tons daily to the Dakota M. & M. Co.'s cyanide plant at Deadwood.

Machinery of the cyanide plant of the Deadwood Standard Co. is being installed at Englewood. The plant will have a capacity of 200 tons.

UTAH.

BEAVER COUNTY.

The Chicago Investment Co. has bonded the Empire group at Frisco, consisting of three claims, for a year at \$20,000 from G. E. Lane and T. McHale of Frisco.

The Majestic M. Co. has made another payment of \$10,000 on account for the O. K. and Harrington-Hickory mines, near Milford.

E. W. Young of Salt Lake City has bought the Welsh Jolly Boy mine, which is located about 5 miles north of Adamsville. The property has produced considerable lead ore. A sample of galena taken from the old stopes by Mr. Young afforded over 70% lead, with thirty-one ounces silver and 60 cents gold per ton.

BOX ELDER COUNTY.

The El Amigo Co. of Park valley, W. Dix manager, has struck the vein in the main tunnel, in 550 feet. Samples indicate a value of \$19.22 per ton gold.

The Susie M. Co., at Park valley, O. A. Bailey manager, is making arrangements for a development of its proposition. Work will be continued through the winter.

GRAND COUNTY.

The Clara Copper M. & M. Co. has been incorporated at Salt Lake City, with capital \$10,000, to operate the Big Squaw, Zions 1 and 2, the Blackbird, and the Blackbirds 1, 2, 3 and 4 claims. W. C. Tracy is president, and H. C. Lund secretary.

IRON COUNTY.

The Oro M. & M. Co., owning the Hope, Beulah, Faith, Sentinel, Old Mack, Old Mack Nos. 2, 3, 4 and 5, Minnie R., Oro, Apex, Keystone and Fairview claims, has been incorporated with office at Milford; capital \$150,000. D. M. Tarry is president and R. L. Nolf secretary.

SUMMIT COUNTY.

The Sunrise M. Co. has been incorporated, capital \$20,000, to operate four claims at Park City, owned by J. C. Hasson. M. H. Hennessey is president and J. C. Hasson secretary and treasurer. About 200 feet of development work has been done on the property, and a shaft is being put down between the lime and quartzite to contact.

TOOELE COUNTY.

The Blaine G. & S. M. Co. has been incorporated, capital \$15,000. B. F. Fleiner is president, H. E. Grow secretary and B. F. Fleiner general manager. The company owns the Blaine, Mikado and Monitor and the Grove Spring mills in Death valley, about 30 miles from Stockton.

The Blaine G. & S. M. Co. has been in-

corporated; capital \$15,000. B. F. Fleiner is president and H. E. Grow secretary at Eureka. The company owns four claims in Death valley, west of Stockton.

WASATCH COUNTY.

The Park-Wasatch M. Co., owning a lease and bond on the Wasatch, Sampson, May, Little Giant, Woodland, Blaine and Summit claims, known as Hoyt's Wasatch group and located in the Blue Ledge district, has been incorporated, with office at Park City and capital \$150,000. J. V. Murphy is president and J. Fairhurst secretary.

WEBER COUNTY.

The Ogden Bollemaker M. Co. has been incorporated at Ogden, capital \$28,000, to operate the Boston mine near Ogden. O. H. Mohlman is president and F. M. Farrell, secretary and treasurer.

WASHINGTON.

KITTITAS COUNTY.

The Fortune M. & S. Co. is operating a mine 25 miles from Cle Elum, on the line of Chelan and Kittitas counties. G. W. Daines, of Danville, Ill., is president and general manager, with office at Spokane. T. Collier, Supt., says the company owns nineteen claims with two leads from 20 to 50 feet wide showing on the surface. A 1050-foot tunnel is being driven to open one of the leads 800 feet down. The tunnel in 900 feet has cut six blind leads.

SPOKANE COUNTY.

The Crystal M. Co. at their annual meeting in Spokane elected J. L. Prickett of Spokane president and J. Gray of Spokane Supt. Plans were outlined for the further development of the mine, on the Spokane Indian reservation, and for a mill on the property to treat the ore.

The Oregon Gold Fields Placer Co. has been incorporated, capital \$75,000, to do a general mining business, with office in Spokane. The trustees are W. T. Turnham, C. D. Crane, S. Trapschuh, F. Nagel and W. O. Appelquist.

WYOMING.

CARBON COUNTY.

In the 115-foot level of the Rambler mine, at Battle Lake, while laying track, a 2-foot vein of black oxide of copper was uncovered. Several blocks of ore, which were thought to be only green carbonate stain and have been overlooked for years, now prove to be nearly solid copper glance, simply coated over with wash and copper stain. One piece found buried in the dump recently will weigh half a ton and is a solid mass of copper glance.

The Battle Lake Tunnel Site Co. at Battle Lake is in 701 feet with its tunnel and is making over 100 feet per month. The formation is changing and quartz strata have been cut that are rich in copper, while the diorite in the face is full of copper pyrites.

Williams, Lamb & Wellman have bought the Crown King claim of W. Cayzer, near Encampment. The mine is developed by a shaft and two tunnels, all of which show good copper.

STEVENS COUNTY.

The Big Strike mining claim on Fish creek, 12 miles east of Boundary City, is shipping ore. J. Keough, one of the owners, states that arrangements are now being made to have the ore treated at the Nelson smelter and that regular shipments would continue during the winter. The ore is silver-copper and very rich, paying the heavy expense of packing over a rough mountain trail a distance of 5 miles to a wagon road, and from there a haul of 7 miles to the nearest railway station.

SHERIDAN COUNTY.

W. T. Barrow says he is preparing to put up a mill on his claims near Sheridan in the spring.

FOREIGN.

BRITISH COLUMBIA.

The Rambler-Cariboo M. Co., operating a silver-lead proposition in the Slokan district, has paid \$120,000 in dividends to date. At present the output is \$30,000 per month. The ore averages about \$100 a ton, mostly in silver, which runs 150 ounces. A new concentrator has been installed at a cost of \$12,000 and has begun operations. This improvement is expected to double the output of the mine.

An iron ore deposit has been found on the Lord Roberts property, near Rossland. The owners are M. McIver and S. Forteach of Rossland. The ledge has been stripped for a width of 40 feet. Samples of the ore assayed 62.9% specular hematite and \$4.40 gold. The ore has some immediate value as a flux for lead smelters, and, it is believed, may prove utilisable for iron smelting.

The yield by dredging of the Saskatchewan river gravel during the past season has been found to be about 25 cents per cubic yard. Mr. Hobson, manager of the dredgers, speaking of the prospects, said:

1. The first of these is the fact that the
the first of these is the fact that the
the first of these is the fact that the

| Parade | |
|-----------------------------------|---------|
| 10000 Sam Con. M. Co. Total | |
| 10000 1/2 share per share | Nov. 16 |
| 10000 Sam. M. Co. 10.25 per share | |
| 10000 1/2 | Dec. 1 |
| 10000 King M. Co. Total monthly | |
| 10000 1/2 share per share | Nov. 16 |

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| Eby, Jno. D. | 23 | | | | | | |
| Edson Manufacturing Co. | 18 | | | | | | |
| Electric Wheel Co. | 1 | | | | | | |
| Electric, Railway & Mfrs Supply Co. | 1 | | | | | | |
| Erierson Telephone Co. | 2 | | | | | | |
| Eureka Co. | 2 | | | | | | |
| Evans & Co., C. H. | 2 | | | | | | |
| Excelsior Redwood Co. | 8 | | | | | | |
| F | | | | | | | |
| Falkenau, Louis. | 14 | | | | | | |
| Fassett, Charles M. | 14 | | | | | | |
| Finn, Oliver R. | 14 | | | | | | |
| Florence & Cripple Creek Railroad Co. | 18 | | | | | | |
| For Sale. | 1 | | | | | | |
| Fowler, G. C. | 1 | | | | | | |
| Fremier & Son. | 21 | | | | | | |
| Free Vanning Machine Co. | 1 | | | | | | |
| Fueller, C. M. | 24 | | | | | | |
| Fulda Tank Manufactory. | 1 | | | | | | |
| G | | | | | | | |
| Garlock Packing Co. | 23 | | | | | | |
| General Concentrates Co. | 23 | | | | | | |
| General Electric Co. | 22 | | | | | | |
| Globe Iron Works. | 8 | | | | | | |
| Goodyear Rubber Co. | 10 | | | | | | |
| Gold & Silver Extraction Co. of America, Ltd. | 15 | | | | | | |
| Gordon, Frank W. | 16 | | | | | | |
| Gutta Percha Rubber & Mfg. Co. | 16 | | | | | | |
| H | | | | | | | |
| Haas, Baruch & Co. | 15 | | | | | | |
| Haff, Edward L. | 15 | | | | | | |
| Hallide Ropeway. | 24 | | | | | | |
| Hanks, Abbot A. | 24 | | | | | | |
| Hansen, John. | 22 | | | | | | |
| Harrison, L. G. | 1 | | | | | | |
| Hartay, A. E. | 2 | | | | | | |
| Heald's Business College. | 11 | | | | | | |
| Hendrie & Bolthoff Mfg. & Supply Co. | 19 | | | | | | |
| Hendy Machine Works, Joshua. | 10 | | | | | | |
| Hercules Bros. | 14 | | | | | | |
| Hersey Clarence. | 13 | | | | | | |
| Hertz & Son. | 13 | | | | | | |
| Holden, S. P. | 8 | | | | | | |
| Hooper & Co., C. A. | 2 | | | | | | |
| Hoskins & Co., Wm. | 10 | | | | | | |
| Hunt, A. M. | 14 | | | | | | |
| Huntington, F. A. | 14 | | | | | | |
| Huntley, D. B. | 15 | | | | | | |
| I | | | | | | | |
| Ingersoll-Sergeant Drill Co. | 8 | | | | | | |
| Irving & Co., James. | 2 | | | | | | |
| J | | | | | | | |
| Jackson Drill & Mfg. Co. | 9 | | | | | | |
| Jackson Machine Works, Byron. | 16 | | | | | | |
| Jeffrey Mfg. Co., Thos. | 16 | | | | | | |
| Jennaville Iron Works Co. | 8 | | | | | | |
| Jessop & Sons, Ltd., Wm. | 15 | | | | | | |
| Jumper Gold Syndicate. | 15 | | | | | | |
| K | | | | | | | |
| Kent Mill Co. | 8 | | | | | | |
| Keuffel & Esser Co. | 15 | | | | | | |
| Keystone Driller Co. | 9 | | | | | | |
| Knight & Co. | 12 | | | | | | |
| Krohn Mfg. Co. | 12 | | | | | | |
| L | | | | | | | |
| Larkin Mining Co. | 2 | | | | | | |
| Lefel & Co., James. | 13 | | | | | | |
| Legg, R. G. | 14 | | | | | | |
| Leschen, A. & Sons. | 10 | | | | | | |
| Lewellyn Iron Works. | 12 | | | | | | |
| Leyner, J. Geo. | 9 | | | | | | |
| Lietz Co., A. | 14 | | | | | | |
| Link-Belt Machinery Co. | 12 | | | | | | |
| Lozial, Filomeno. | 1 | | | | | | |
| "Locomobile" Company of the Pacific. | 1 | | | | | | |
| Luckhardt Co., C. A. | 14 | | | | | | |
| Lunkenheimer Co. | 21 | | | | | | |
| M | | | | | | | |
| Macbeth & Co., James. | 14 | | | | | | |
| Madison, H. Bernard. | 14 | | | | | | |
| Madison, H. Bernard, Solors. | 15 | | | | | | |
| Main Belting Co. | 16 | | | | | | |
| Manning's Assay Office. | 14 | | | | | | |
| Marion Steam Shovel Co. | 22 | | | | | | |
| Marshall & Cantrell. | 1 | | | | | | |
| Martinez, Luis A. | 24 | | | | | | |
| McFarlane & Co. | 8 | | | | | | |
| McGraw, Wm. | 14 | | | | | | |
| Merle Co., A. | 10 | | | | | | |
| Michigan College of Mines. | 2 | | | | | | |
| Midland Terminal Railway Co. | 5 | | | | | | |
| Mine & Smelter Supply Co. | 14 | | | | | | |
| Miners' Assay Office. | 14 | | | | | | |
| Mining Bureau & Real Estate Co. | 2 | | | | | | |
| "Mining Investor". | 2 | | | | | | |
| Mohican Mining & Milling Co. | 2 | | | | | | |
| Montague & Co., W. W. | 17 | | | | | | |
| Moore & Co., Chas. C. | 16 | | | | | | |
| Morris, H. D. & H. W. | 22 | | | | | | |
| N | | | | | | | |
| National Iron Works. | 1 | | | | | | |
| Neill, James W. | 14 | | | | | | |
| Nevada Metallurgical Works. | 14 | | | | | | |
| New Era Machinery Co. | 22 | | | | | | |
| New Process Raw Hide Co. | 21 | | | | | | |
| O | | | | | | | |
| Ogden Assay Co. | 14 | | | | | | |
| Oriental Gas Engine Co. | 10 | | | | | | |
| Otis, McAllister & Co. | 1 | | | | | | |
| P | | | | | | | |
| Pacific Coast Rubber Co. | 1 | | | | | | |
| Pacific Coast Smelting & Refining Works. | 24 | | | | | | |
| Pacific Engineering Co. | 14 | | | | | | |
| Pacific Refining & Roofing Co. | 13 | | | | | | |
| Pacific Tank Co. | 10 | | | | | | |
| Paraffine Paint Co. | 18 | | | | | | |
| Parke & Lacy Co. | 24 | | | | | | |
| Paul, Almar B. | 14 | | | | | | |
| Pennington Sons, Inc., Geo. W. | 13 | | | | | | |
| Perez, Richard A. | 2 | | | | | | |
| Peterson, L. | 2 | | | | | | |
| Phillips & Co., Alvin. | 14 | | | | | | |
| Phillips Rock Drill Co. | 9 | | | | | | |
| Phillips, W. C. | 14 | | | | | | |
| Phoenix Cyanide Process Co. | 14 | | | | | | |
| Postlethwaite, R. H. | 21 | | | | | | |
| Powell Co., Wm. | 21 | | | | | | |
| Prescott & Eastern Railroad. | 11 | | | | | | |
| Putnam, H. J. & Co. | 17 | | | | | | |
| Q | | | | | | | |
| Quick, Jno. W. | 2 | | | | | | |
| R | | | | | | | |
| Rand Drill Co. | 9 | | | | | | |
| Redington & Co. | 2 | | | | | | |
| Rose, I. Elmer. | 14 | | | | | | |
| Richards, J. W. | 14 | | | | | | |
| Ridson Iron Works. | 4 | | | | | | |
| Ritz Compressed Air & Drill Co. | 9 | | | | | | |
| Robins Conveying Belt Co. | 5 | | | | | | |
| Roebbling's Sons Co., John A. | 23 | | | | | | |
| Roesler & Hasselbacher Chemical Co. | 15 | | | | | | |
| Rogers, E. B. & Co. | 1 | | | | | | |
| Rosenberger, A. F. | 1 | | | | | | |
| Roy & Titcomb. | 1 | | | | | | |
| S | | | | | | | |
| San Francisco Pioneer Screen Works. | 2 | | | | | | |
| Sands & Wood. | 14 | | | | | | |
| Sanford, Albert B. | 14 | | | | | | |
| Santa Fe Railroad. | 18 | | | | | | |
| Schaw, Ingram, Batcher & Co. | 21 | | | | | | |
| School of Practical Mining. | 14 | | | | | | |
| Selby Smelting & Lead Co. | 17 | | | | | | |
| S. H. Supply Co. | 1 | | | | | | |
| Simonds, Ernest H. | 14 | | | | | | |
| Simonds Saw Co. | 17 | | | | | | |
| Situations Wanted. | 1 | | | | | | |
| Smith & Co., F. L. | 22 | | | | | | |
| Smith & Co., S. Morgan. | 13 | | | | | | |
| Smith & Co., Francis. | 13 | | | | | | |
| Smith & Thompson. | 15 | | | | | | |
| Smooth-On Mfg. Co. | 15 | | | | | | |
| Standard Oil Co. | 2 | | | | | | |
| State Ore Sampling Co. | 14 | | | | | | |
| Stevens, Ralph E. | 14 | | | | | | |
| Stillwell-Bierce & Smith-Valle Co. | 14 | | | | | | |
| Stockton Business College. | 2 | | | | | | |
| Strout & Son, W. H. | 15 | | | | | | |
| Sturtevant Mill Co. | 15 | | | | | | |
| Sullivan Machinery Co. | 23 | | | | | | |
| T | | | | | | | |
| Taylor Iron & Steel Co. | 21 | | | | | | |
| Taylor, John & Co. | 13 | | | | | | |
| Taylor & Co., P. T. | 13 | | | | | | |
| Trenton Iron Co. | 21 | | | | | | |
| Tyler, S. W. | 14 | | | | | | |
| U | | | | | | | |
| Union Gas Engine Co. | 19 | | | | | | |
| Union Iron Works. | 3 | | | | | | |
| Union Photo-Engraving Co. | 22 | | | | | | |
| V | | | | | | | |
| Van Der Naillen, A. | 14 | | | | | | |
| Van Wagenen, Theo. F. | 14 | | | | | | |
| Vulcan Iron Works. | 13 | | | | | | |
| W </ | | | | | | | |

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ASSESSMENT NOTICES.

LARKIN MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, El Dorado County, California. Notice is hereby given, that at a meeting of the Board of Directors, held on the 7th day of November, 1901, an assessment (No. 1) of two cents per share was levied upon the capital stock of the corporation, payable immediately to the secretary, at the office of the company, 112 Main street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 14th day of December, 1901, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 8th day of January, 1902, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

N. F. REMINGTON, Secretary.

Office—112 Main street, San Francisco, California.

MORICAN MINING & MILLING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Tuolumne County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 6th day of November, 1901, an assessment (No. 2) of five cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, No. 300 California street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 4th day of January, 1902, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 8th day of February, 1902, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

JNO W. CLASSEN, Secretary.

Office—No. 300 California street, San Francisco, California.

THE CALIFORNIA DREDGING COMPANY.—Principal place of business, 120 Sutter Street, San Francisco, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 22nd day of October, 1901, an assessment (No. 3) of \$10 per share was levied upon the capital stock of the corporation, payable immediately in gold coin, to the secretary of the corporation, at the office of the company, 120 Sutter Street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on MONDAY, the 25th day of November, 1901, will be delinquent and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 16th day of December, 1901, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

SAM. W. CHEYNEY, Secretary.

120 Sutter Street, San Francisco, California.

AMERICAN OIL AND REFINERY COMPANY.—Location of principal place of business, San Francisco, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 21st day of October, 1901, an assessment of five (5) cents per share was levied upon all the subscribed capital stock of the said corporation, payable immediately to J. C. Anthony, secretary of said corporation, at its office, at room No. 323 of the Parrott building, Nos. 325 to 335 Market street, in the City and County of San Francisco, State of California.

Any stock upon which this assessment shall remain unpaid on the 25th day of November, 1901, will be delinquent and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 23rd day of December, 1901, to pay the delinquent assessment, together with costs of advertising and expenses of sale.

J. C. ANTHONY, Secretary.

Office—Room 323, Parrott building, Nos. 325 to 335 Market street, San Francisco, California.

YUBA CONSOLIDATED GOLD MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Nevada County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 12th day of October, 1901, an assessment (No. 4) of three cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin to the secretary, at the office of the company, Room 801 of the Claus Spreckels Building, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 15th day of November, 1901, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 16th day of December, 1901, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

EDWARD H. STEARNS, Secretary.

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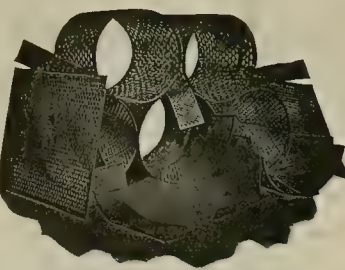
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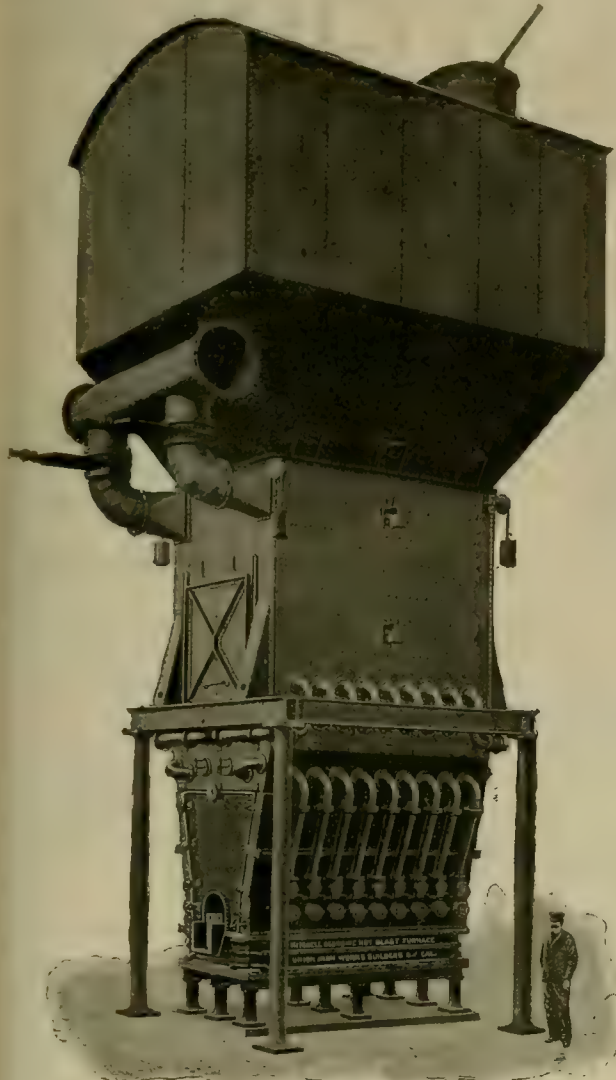
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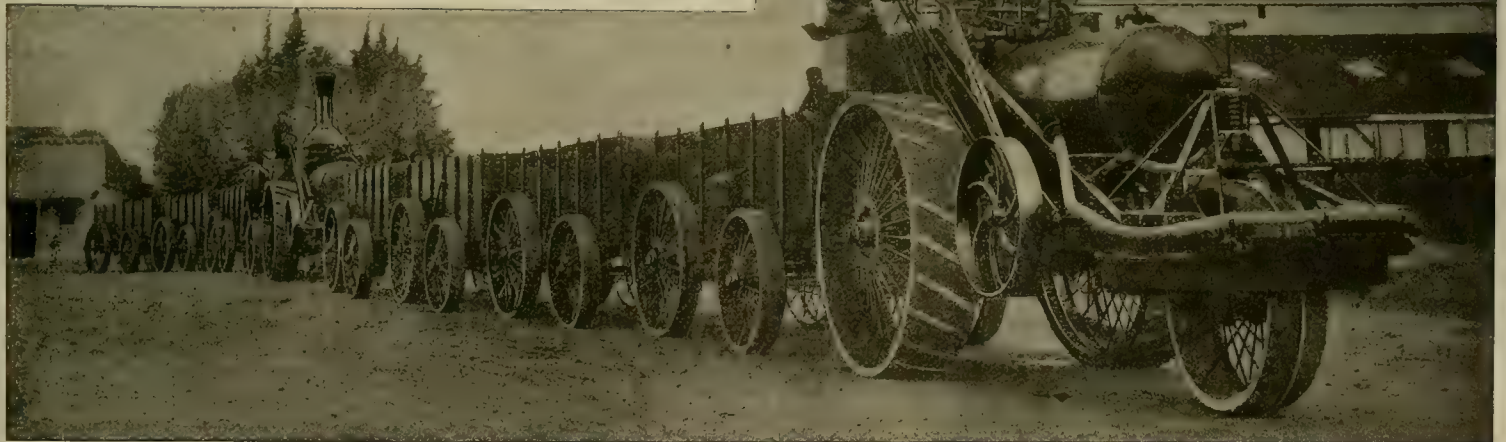
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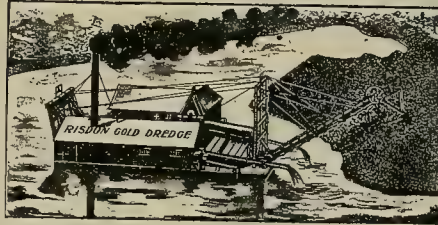
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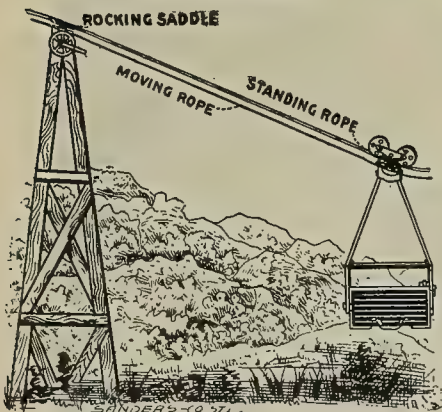
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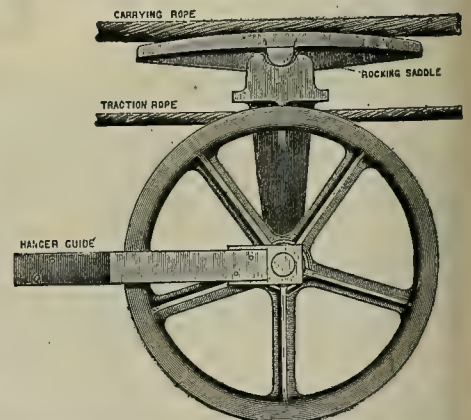
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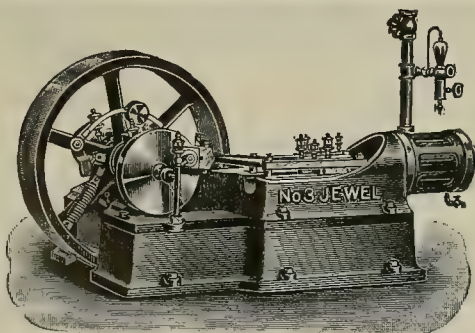
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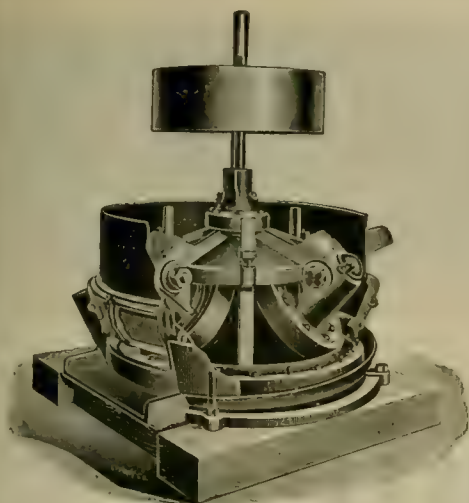
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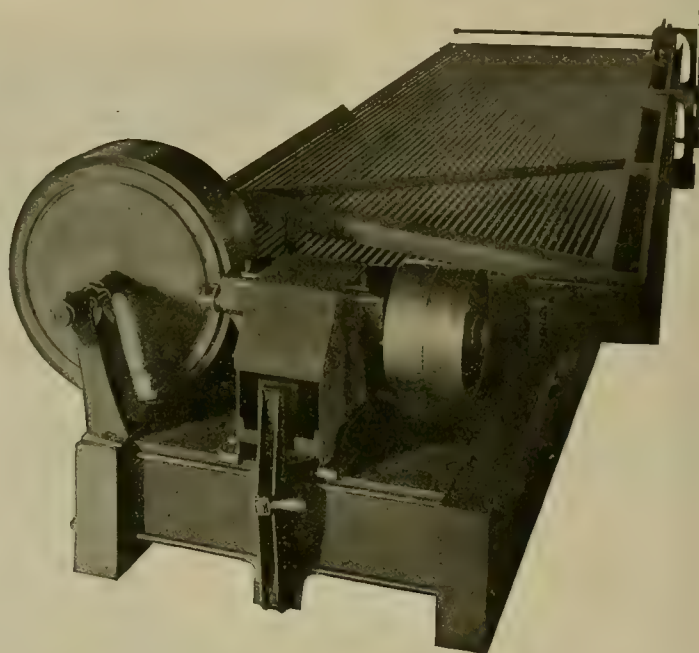
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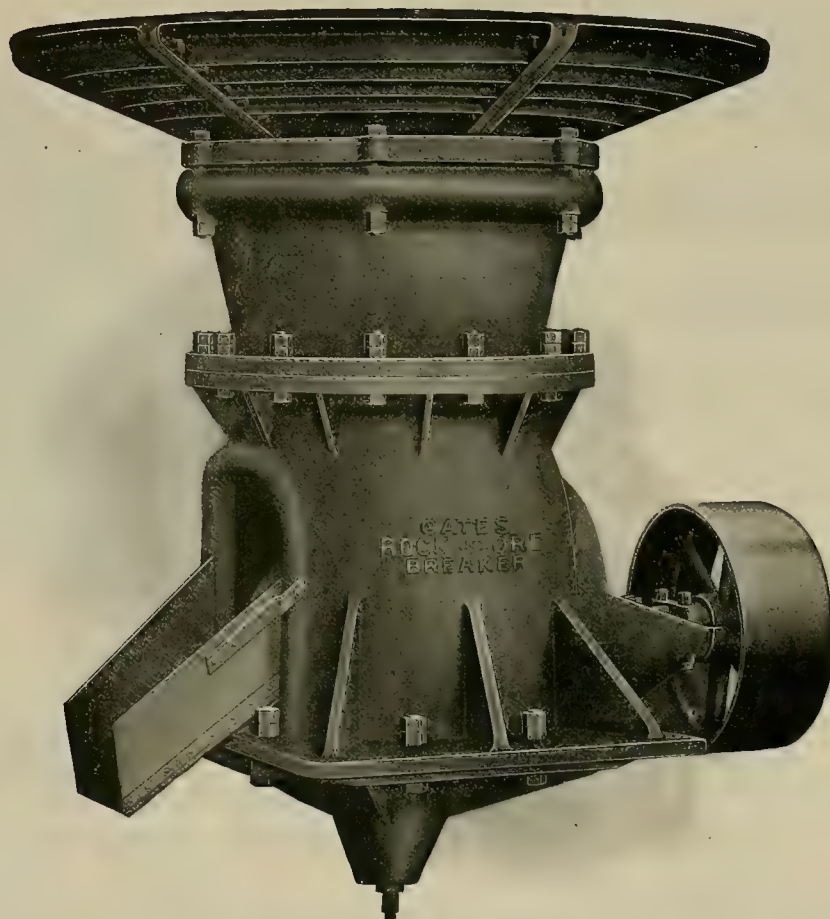
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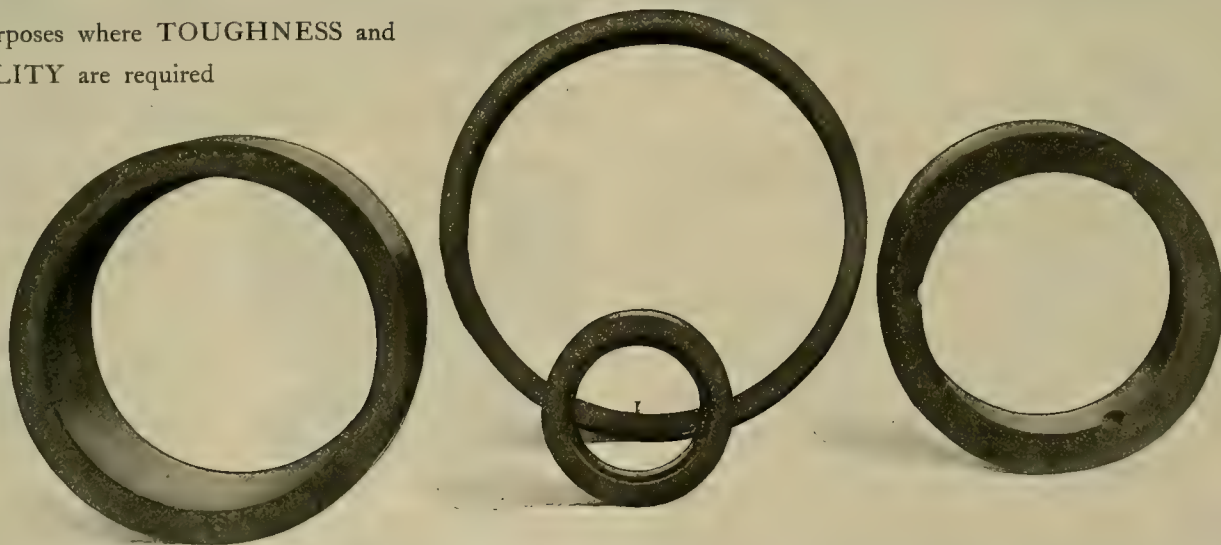
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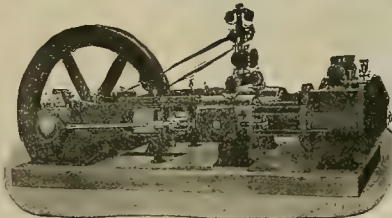
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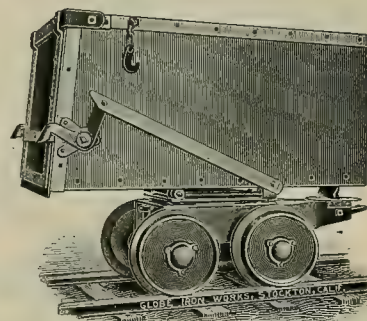
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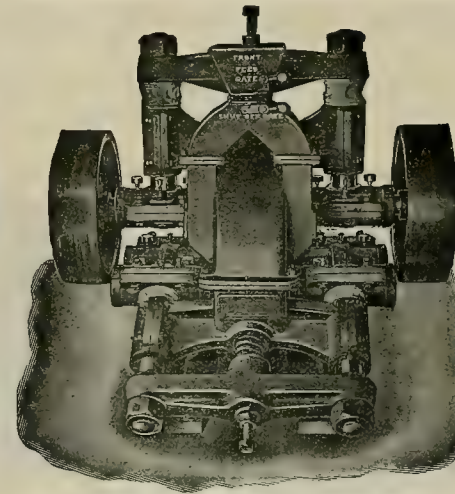
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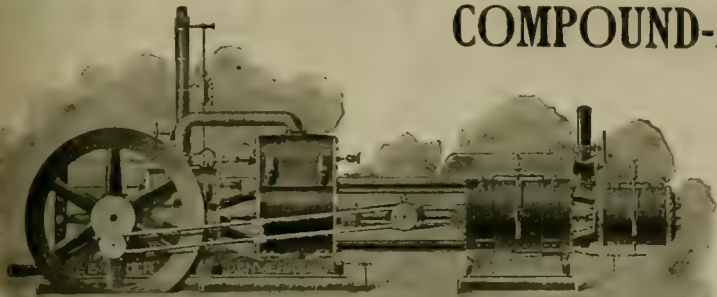


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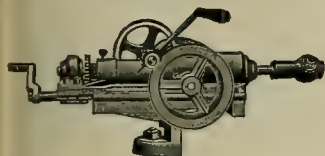
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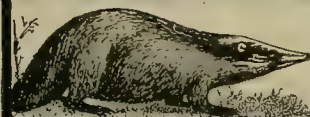
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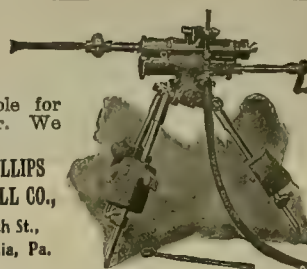
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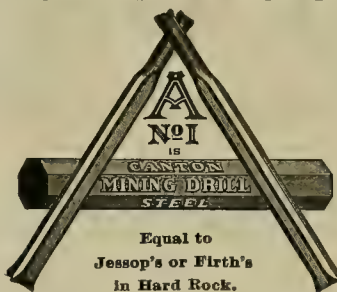
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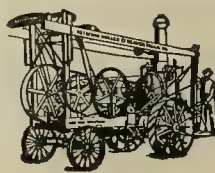
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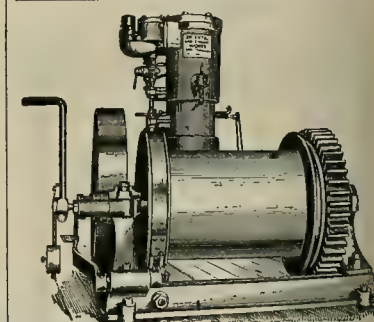
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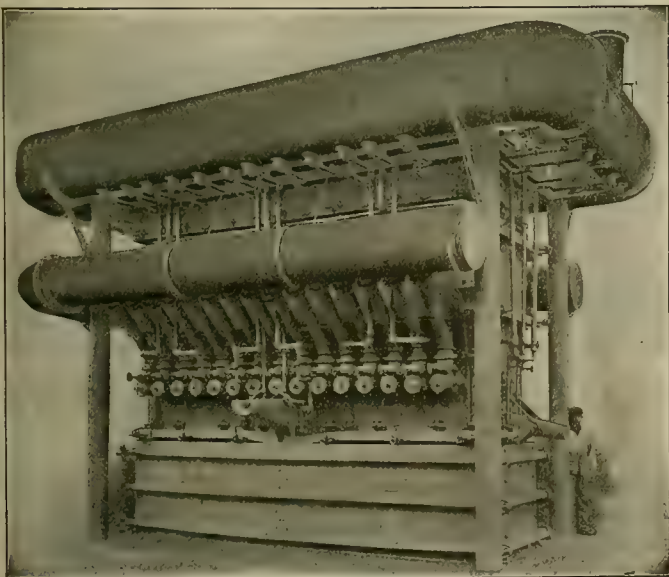
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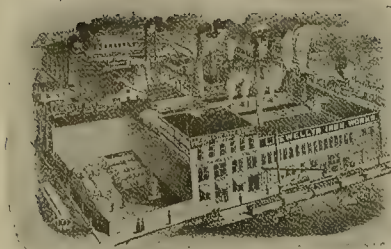
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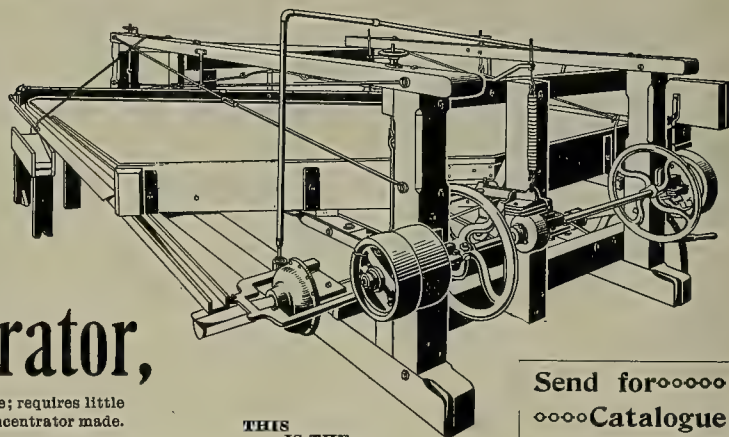
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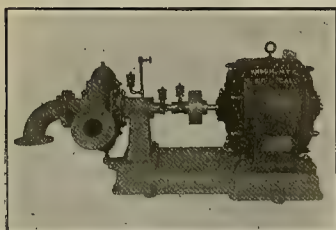
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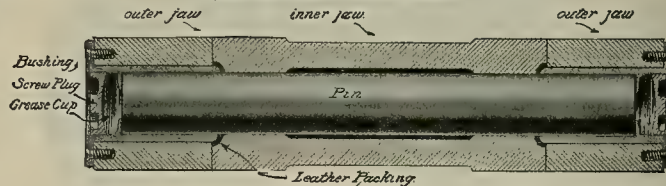
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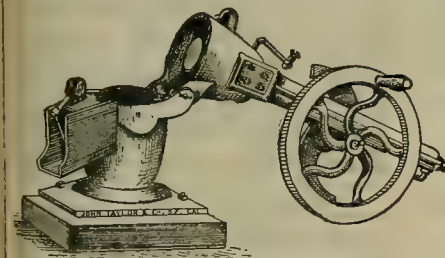
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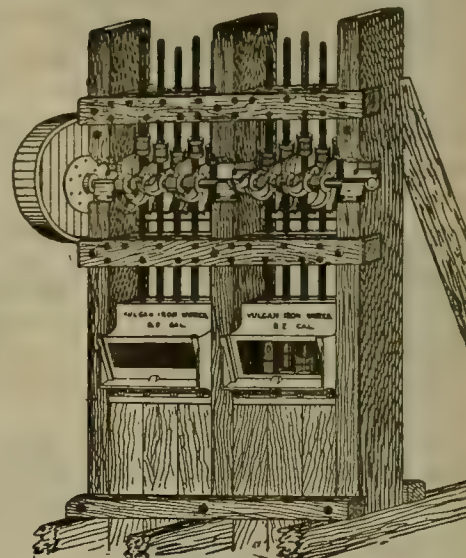
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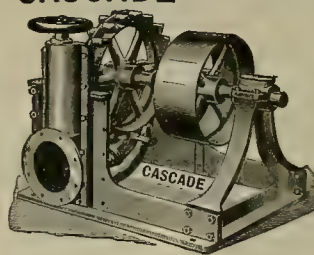
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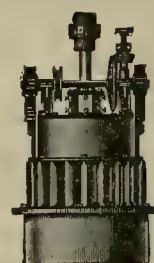
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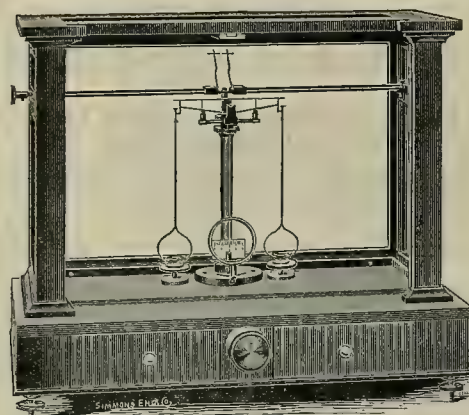
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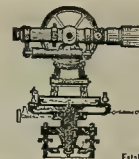
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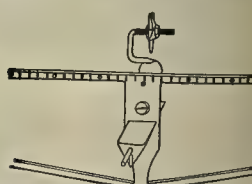
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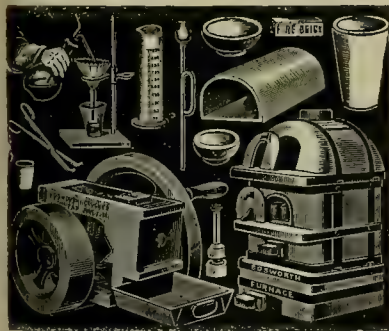
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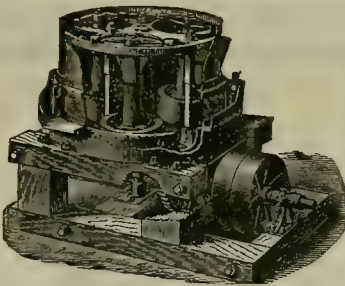
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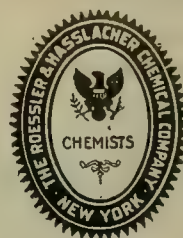
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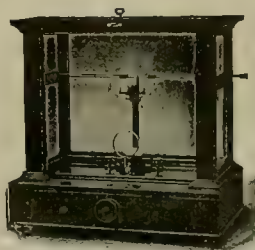
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NOTICE IS HEREBY GIVEN, that pursuant to written consent of the holders of more than two-thirds of the capital stock of THE JUMPER GOLD SYNDICATE OF CALIFORNIA, LIMITED, a corporation organized under the laws of the State of California, and also pursuant to a resolution of the Board of Directors of said corporation, the principal place of business of said corporation has been removed from the City and County of San Francisco, State of California, to the Jumper Mine, in the County of Tuolumne, in said State of California.

(Signed) WILLIAM ADAM,

Secretary of The Jumper Gold Syndicate of California, Limited.

Dated San Francisco, October 25th, 1901.

THE CALIFORNIA DEBRIS COMMISSION, having received applications to mine by the hydraulic process from W. B. Swank, in the Gold Run Mine, near Mountain Ranch, Calaveras Co., to deposit tailings in a ravine below the mine; from D. Hartley & Co., in the Roanoke Mine, near Placerville, El Dorado Co., to deposit tailings in White Rock Creek; from Wm. McDonald, in the Dardanelles and Oro Placer Mine, near Forest Hill, Placer Co., to deposit tailings in Dardanelles Canon; and from W. S. and C. A. Cooley, in the Smith Bar Mine, near Keep, Plumas Co., to deposit tailings in a worked-out pit, gives notice that a meeting will be held at Room 59, Flood Building, San Francisco, Cal., on December 2, 1901, at 1:30 P. M.

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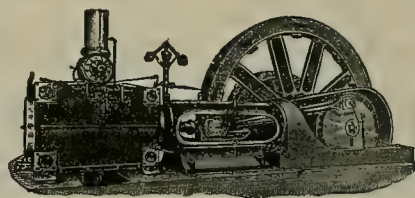
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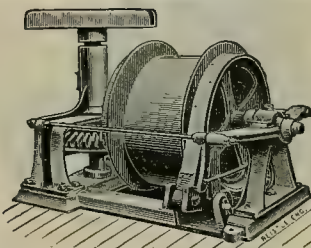
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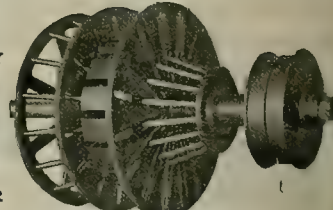
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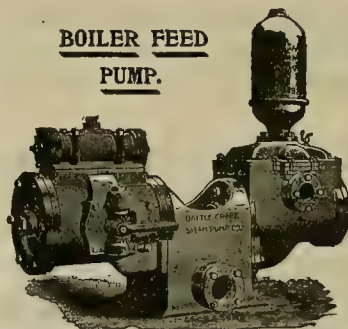
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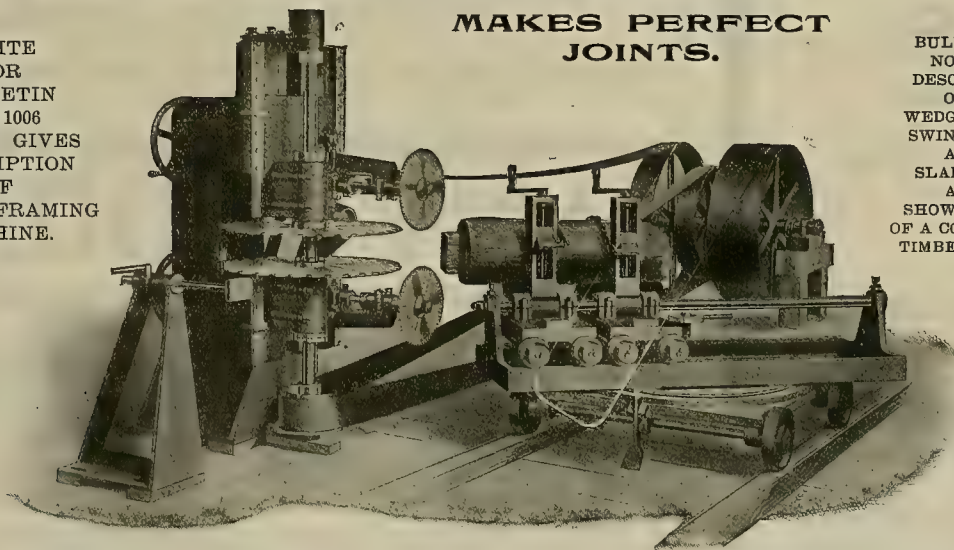
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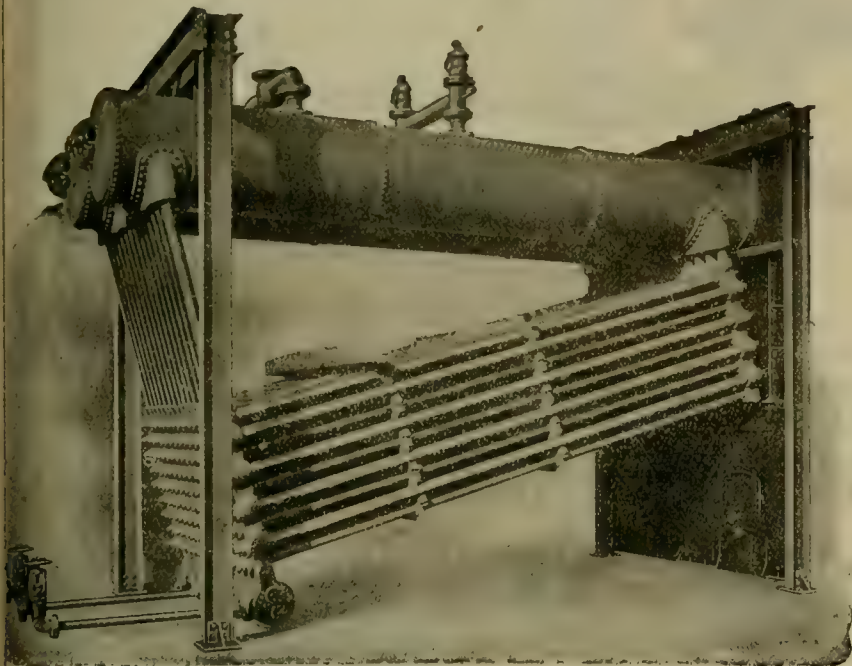
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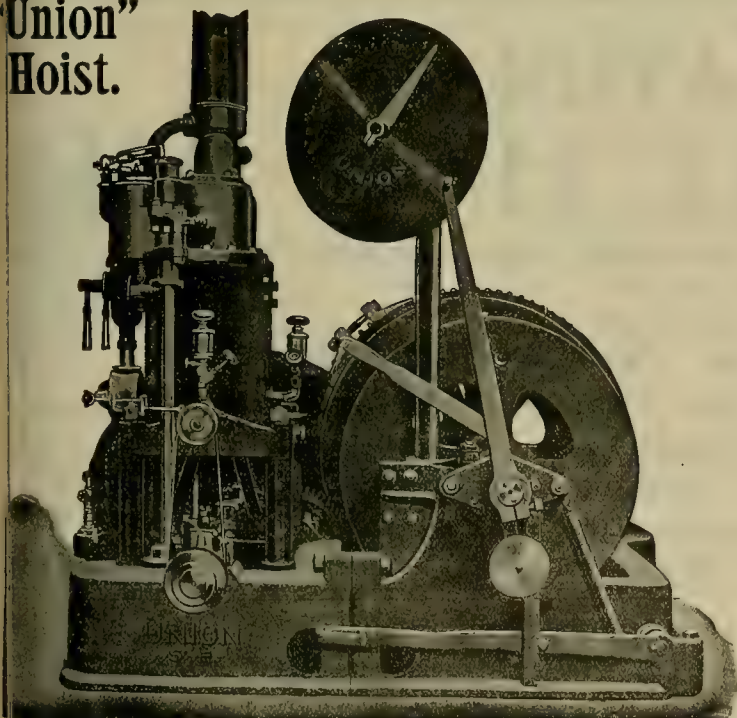
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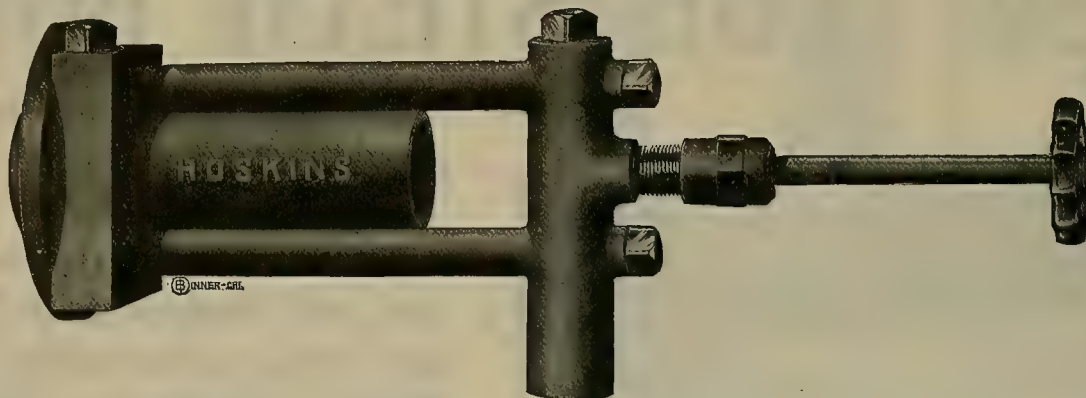
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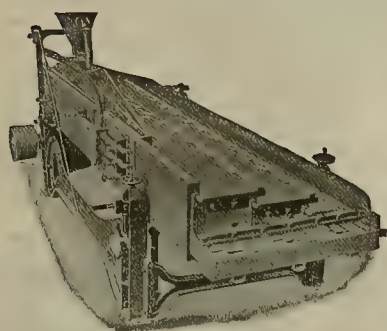
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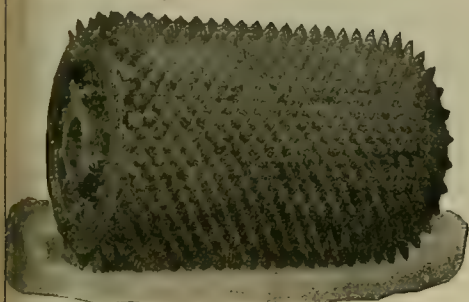
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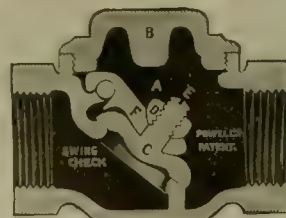
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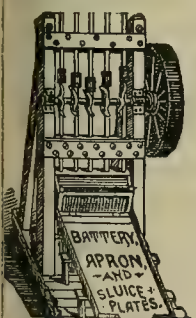
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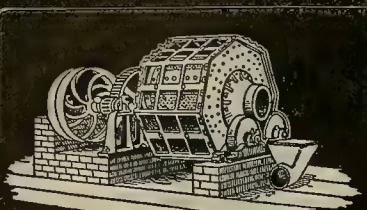


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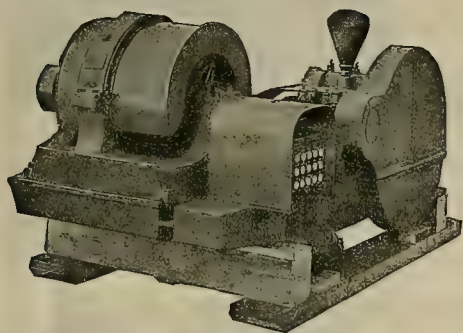
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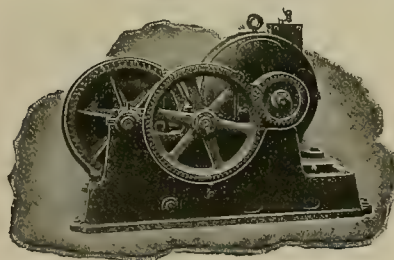
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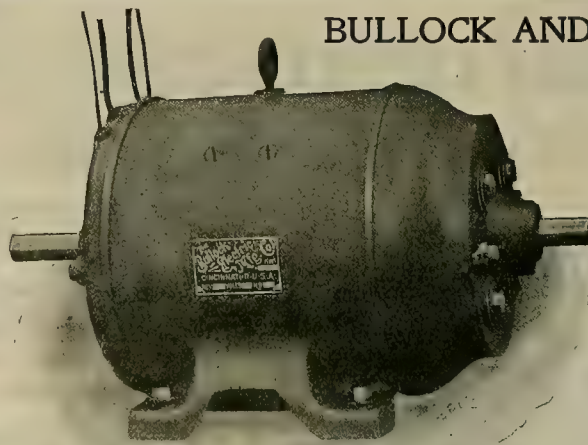
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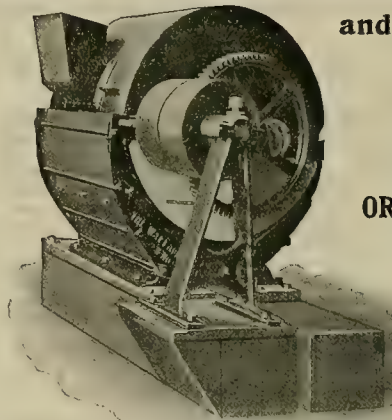
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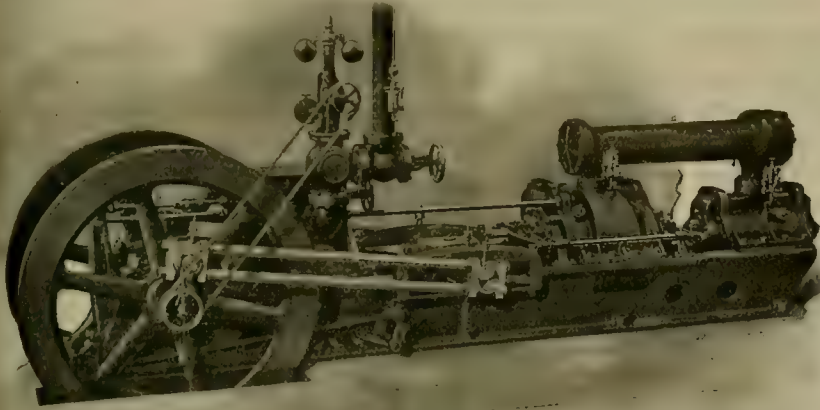
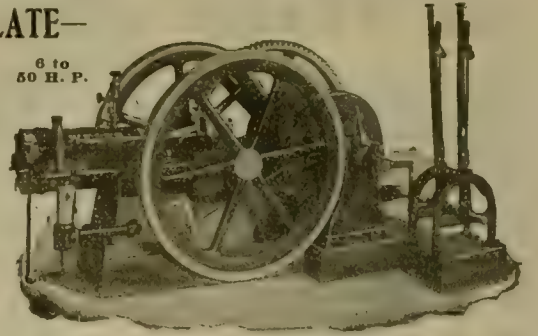
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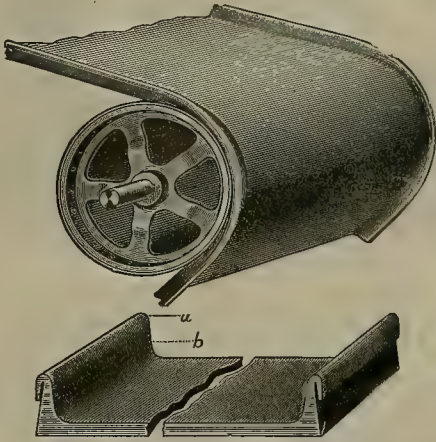
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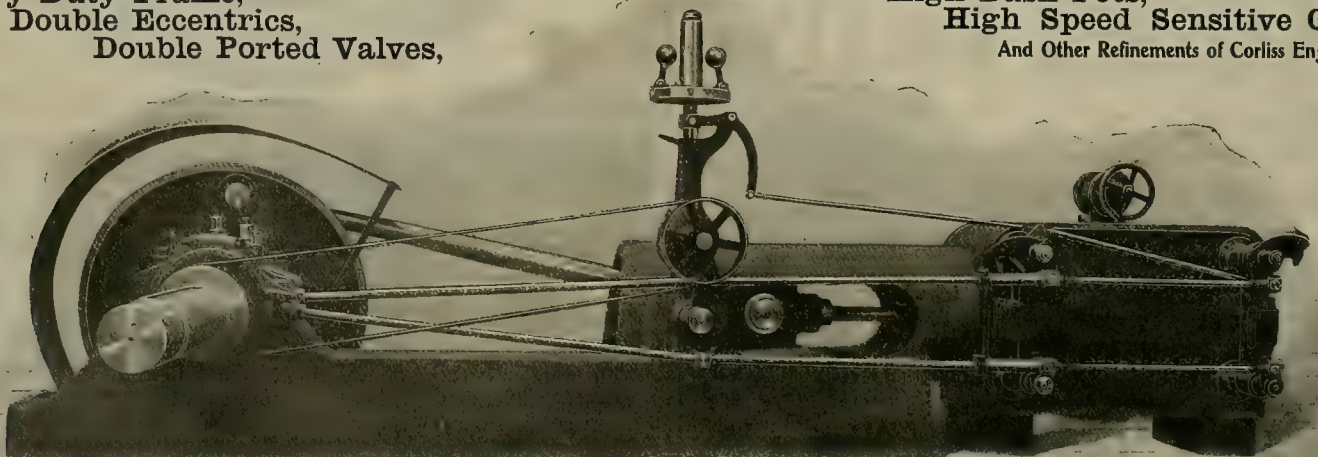
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# MINING AND SCIENTIFIC PRESS.

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## Quartz Prospecting in California.

The accompanying illustration of an overshot water wheel, connected with a simple hoisting gear, and the uncovered prospecting shaft, are characteristic sights in the gold quartz mining districts of California. It is an economical, useful type of mine rig, and though the development of conditions when the miners were compelled to design and make their own mining appliances from the crude materials closest to their hand, it survives, and is in as common use at this time as ever before, simply because of its superior cheapness and adaptability to the prospectors' use.

These wheels are made from 24 to 30 feet in diameter. No great technical skill is required to build them. The nearest stream or ditch furnishes the water supply to run them. With a little additional timber and blacksmith work, the same wheel will furnish power to work a Cornish pump and to run an arrastra or prospector's mill.

The entire plant is entirely within the prospector's constructing knowledge and his means. The latter is particularly important to the prospector, as his object in prospecting is to get means. With this rig replacing the hand windlass, quite extended workings can be carried on to depths as much as 250 feet, provided, of course, that the water flow is not large.

Quartz prospecting in California is more exactly definable as small mining. The occupation is engaged in for the profit in it. Outside of the prospector's labor, there is little expense attached to it. Explosives, candles, a few tools, and these small operations, involving next to no capital but the owner's time, are profitable on very low-grade ores. There are many instances where, with simple, inexpensive hoisting and milling plants, ore that only went \$4 to \$5 to the ton has paid high wages to the owners doing their own mining.

There is nothing of the sensational about this kind of mining. It is not a great business. It is, though,

a most independent occupation. These miners of gold are not bothered with combinations to restrain overproduction; they do not have to guess which way the metal market or the stock market is going. Producing gold, they compete with no one in any other industry.

Large mines and great mining plants are unquestionably of great economic value to a community. Little mines with their primitive but efficient installations are not, however, to be overlooked. If anything, they form a more certain industrial resource for a mining district than a big single mine. Particularly is this true of gold mining. The large producer from mining of other metals has many business advantages over the small producer. He can produce his metal cheaper and sell it for more. He can sell it when the small producer is unable to sell. Small lead miners have found these facts out lately. Big prices, as well as low costs, have been made for the big producers, not for the little ones. With the miners of free-milling gold-bearing quartz there is no such penalty attached to being a small producer and having a little mine. It is rather the other way.

THE completion of the Trans-Siberian Railroad opens up Siberia and central Asia to the introduc-



The Humphreys Concentrating Mill, Creede, Colo.—(See Page 218.)

tion of American machinery, and, to a lesser extent, the American methods which make it effective. Trade in the former will extend more rapidly than the commercial output from the latter. The road is hardly complete, yet it is shown from the latest reports that Lake Baikal is still being ferried. This in no way, however, interferes with the use of the line as a railroad. It is, however, surprising to learn that the Trans-Manchurian line, which was reported so extensively destroyed by the Chinese, has been restored and the gap in it closed. Later reports do not make such roseate statements about the completion, even though the officials have congratulated themselves and the Czar. Travelers say the line is far from complete, that many bridges remain to be constructed across the large rivers, and also many minor gaps exist beside the great one of Lake Baikal. The absence of bridges will be less of a disadvantage in winter than in summer. Once frozen, the Siberian Railroad practice is to lay rails on the ice and move the rolling stock on them. This device has been applied during the construction to advance locomotives and cars, so as to have their assistance for construction during the summer. Two entire divisions of the road, between the Obi river and Krasnoyarsk, on the Yenisei river, and between the latter stream and Irkutsk, on the Angara river, were commercially operated by this means for several years before the bridges were completed. One difficulty of construction that is retarding completion is the roadbed over swampy ground. In winter, with the swamp frozen, the roadbed holds up, but in summer it is subject to considerable and uneven subsidence under the weight of roadbed filling and jarring of the trains. The minor bridging is largely cribwork and trestle construction made of the light native timber unseasoned and without the sap wood removed. Many of these constructions have rotted and required replacement within three years of their building. The same criticism applies to the ties which are largely made by splitting in half 8-inch diameter fir trees with the bark removed. In the first built sections these were again spaced too far apart. Contrasted with the later American standard railroad construction, the Trans-Siberian road is rather below it.



A Characteristic California Quartz Prospector Hoisting Rig.



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## Fraudulent Siberian Mining Schemes.

Conscienceless promoters are again coming into sight with attractive looking propositions for miners and others to go to Siberia with the opening of navigation next spring. The attractiveness of such propositions is entirely in their looks on paper. The promoters are utterly unable to realize any of the things they promise to the people who will discover after they are separated from their money that they have been swindled.

These fellows with their Siberian schemes do not go to capital with them, as they could if they really had the merit they advertise behind them, but seek for their victims people who have by self-denial and deprivation saved up a few hundred dollars. This they speciously ask for as payment for transportation to the Siberian gold mines.

The facts regarding Siberian mining enterprises are not at all what these promoters represent. In the first place, only Russian subjects can get mining claims at all. After the discovery it takes two years or more to get an authorization to mine the discovery. A miner is not allowed to explore and mine at will on the State domain. A Russian mining enterprise may have a foreign owner in it, but it must be managed by the Russian owner. The Government demands a royalty of the gross placer gold and the miner must send the gold to Irkutsk, no matter how distant, and it is there paid for in Russian paper money. The export of gold is prohibited by law under severe penalties. Such an arrangement as a "lay" or mining partnership of the Alaska kind is impossible in Siberia. The gold cannot after mining be directly divided, the miner taking his share and the owner his. Russians who have good gold placers in Siberia do not take foreign partners. What are known as "concessions" for the mining of a large territory are not given till the cream of the ground has been worked out.

The mere statement of these Russian mining laws should be sufficient to condemn without reservation the schemes of promoters who ask American dollars from poor people for their pretended Siberian mines. No one but the Czar can alter a Russian mining regulation, and no alteration has been made in these regulations as a result of the discovery of gold in other countries.

No one under any consideration should accept the proposition of these dishonest promoters or give them a dollar. They have absolutely nothing to give in return for it.

Gold mining is hard enough in our own far north land. The natural difficulties are extreme and make the cost of gold high even with the richest deposits.

The legal difficulties that owners of claims have in holding them are by no means light, as the history of mine litigation at Nome shows. But all these physical and political difficulties are relatively insignificant as contrasted with what foreign miners must contend with in Siberia.

## The Lead Miners' Meeting.

Lead mining is at the present time suffering from the effect of a production exceeding consumption, aggravated by the effect of a high sale price, which has induced the starting up of many new producers. The remedy that is suggested most generally is the restriction of production by an agreement between producers. The American Smelting & Refining Co. favors this method, one of the officers, however, stating that it is entirely an affair that the miners must settle, as the smelting interests are only concerned indirectly as the buyers of lead ores based on the market price, whatever it may be. The business advantages of a steadily maintained price are set forth to support the necessity for making the agreement. The condition of the lead mining industry before the establishment of the present price, when lead miners were keeping prices low through competition in selling, is referred to as the bad example of what will happen if the miners do not limit production by agreement.

One fact may be accepted to begin with. There is more lead being produced than consumed. A second fact would appear to be fairly well established. The excess amount of production is the result of increase in production outpacing the increase in consumption. A presumption, which may not prove to be a fact, is that a reduction in price will not increase consumption and thus bring it up to production again. Present uses of lead seem to be independent of the present price. They are not diminished in amount by the price being high. They would not likely be increased if the price was lowered. It cannot, however, be said in this industrial age that with a lower price there will not be new uses invented for the metal.

The American Smelting & Refining Co. is not making the same statements that it did when it was organized. Then the story of the managers was that by monopolizing the smelting and refining they could maintain the existing high price indefinitely and that the miners would have a sure market for their ores. Nothing but the monopoly has materialized. They admit they cannot hold up the price beyond the life of their existing contracts. They have not furnished a sure market for the miners' ores. Smelter charges, however, have been maintained despite the economies made in their operation. So far as the lead miner is concerned the combination of the smelting and refining business has been a failure. Will the combination of the mining interests that has been suggested prove any more effective?

It must be taken into account that it is not good business to produce more lead than is consumed. It is simply loading the cost of production with interest on that cost, and abnormal commercial conditions, that cannot be safely anticipated, would be the only possible chance of the disposal of the surplus. The reasonable view would be that it would continue to accumulate until it broke down the carrying capital. There remains, then, only the restriction of production, first, to much less than consumption, until the existing surplus is worked off, and, second, the subsequent limiting of it to the consumption demands.

There are two ways in which production can be restricted: The lowest-grade mines, or mines with the least margin of profit, can be shut down, and the higher-grade mines work up to their full capacity, or all the mines can scale down their output. Either mode is open to the objection that the development of new mines will shut down, or scale down, more of the old ones, who make the first sacrifices. The first mode has special objections arising from two sources: The owners of these low-grade mines, which generally have large, costly installations, as compared with the higher grade mines, would object to having their investments made idle, and the American Smelting & Refining Co., which is in the business for quantity rather than quality, would not be inclined to favor this mode. They make

more from treating two tons of 30% ore than from one ton of 60% ore. This mode of limiting production is the mode taken by competition which eliminates the poorer and weaker, but does it at the cost of losses which are sustained by all. The same result obtained by agreement saves these losses.

The other method of restriction, by limiting arbitrarily the amount each mine can produce toward the total, is open to the objection that it reduces the economy of operation of all the mines, and some of them below the profit margin point.

Directly or indirectly, the price of overproduction in lessened profits must be paid. If prices are kept up, the profit on the consumption must be diminished by uneconomical costs which are incurred.

Looking at the situation from this end backward, the artificial lifting of the price seems to have brought permanent disabilities to the lead mining industry that more than counterbalance the first profits. New operations were initiated handling large bodies of low value ores, which operations, going now, must continue to go if they only pay costs. The smelting combination gives them a preference as against the smaller mines producing lesser quantities of high-grade ore, which they penalize by higher treatment charges.

As matters are at present, while what to do is debatable, the chances favor something happening. The miners will fail to make an agreement to shut down some mines entirely and will be unable to agree on the respective shares of the losses of economy that will come from scaling down all the mines. The scaling down would have to be to about half. The Coeur d'Alene mines have been restricted a quarter to a third, and the Leadville, Colo., mines even more, yet the surplus has continued to accumulate. What will happen most likely will be that the price will get away from the controlling power that holds it up now and will drop quite low and be anybody's to make and hold. It will be a violent remedy, but the chance of having to try it is so near that lead miners will do well to prepare for it in advance.

## The Latest Gold Manufacturer.

The scene is shifted from the sea islands of the Maine coast. It is now opened in the heart of nature's own gold factory, the Rocky mountains in Colorado. Gold is not to be taken ready made out of the salt sea water this time. It is said that this new discovery makes gold from just nothing at all, grows it from the attenuated mountain atmosphere.

A Professor Wynn is the new magician who is willing to give up his secret and most of the gold he makes if permitted to have the lesser part of the gold. The proposition is being liberally entertained, it is reported, by Denver farmers whose crop of rocks it threatens to make valueless. One railroad manager is reported to be absorbed in the proposition and another man is reported to have left the scene of a test with a significant smile.

Somewhat in the lines of early education in mining, the professor doesn't get anything by fire assay, but does extravagantly well with his own test. His recovery is still weak, however. His own tests show very much more escaping him in the tailings than he recovers. His explanation is that it grew—it may be like yeast—from the start his process gave the rocks.

Naturally, the professor is reticent about his process. He has no gold brick ready for sale yet. The professor is already talking of restraining the output so as not to break the gold market. This is, of course, consideration on his part that the owners of gold mines in Colorado and elsewhere will undoubtedly appreciate.

THE market for silver has now in sight the renewal of purchases by the United States Treasury. At the present time there is in the Treasury available for coinage only about \$42,000,000 of the stock purchased under the Act of 1890. Under this Act the Treasury bought 168,674,682 ounces for coinage, paying out for it \$155,931,000. This has been steadily drawn on for coinage, and what is left is going out at the rate of \$22,000,000 annually. In two years none of this old stock will remain, and before that time the Treasury should be a purchaser again. Congress will, however, have to pass a new Act authorizing the purchase of silver.



## Concentrates.

MONAZITE is valuable only for the thorium it contains in the form of phosphate. The use of the thorium is in making Welsbach mantels.

THE nickel-copper matte obtained at Sudbury, Ontario, contains about two ounces of platinum and an ounce and a half of palladium to the ton of matte.

THE siphon process will not work to a greater depth than 28 feet 4 inches at an altitude of 60 to 200 feet. Any pipe laid or time spent to a greater depth will prove a loss.

THE presence of lime in drinking water can be determined by putting a couple of drops of oxalic acid into a glassful of the water and blowing on it. If it turns milky, lime is present.

THE value of any thing taken can not be regarded as enhanced by the taking. The value of that taken must be determined by the use which the owner could make of it for his own purposes.

THE diameters of pipes refer to the interior diameter. The diameter of casing is the outside diameter. Casing has special threading and special fittings that are not interchangeable with pipe fittings.

LATE mill construction practice provides about 3 H. P. in the power plant for each stamp head, the excess over that used by the stamps moving the rock breakers, concentrators and other mill machinery.

THE term "cable" is correctly applied to any heavy rope or chain designed to sustain great strain. Whether it be flat or round, made of steel or hemp, used on land or sea, it is a "cable" when used in the manner indicated.

THE Supreme Court of Utah in the case of Crouch, Weldon et al vs. J. Welsh and the Huntsman M. Co., decided that lessees on mining claims may remove buildings and other mining improvements that they have put on them.

AN aperture 12 inches high by 12½ inches wide, cut through a 1½-inch plank, with 6 inches depth of water over the top edge of the opening, will discharge 200 miner's inches of water—a small fraction less than 300 cubic feet a minute.

THE Mont Cenis tunnel, in the Alps, was driven at the rate of 18 feet a day at a cost of \$373 per foot. The St. Gotthard tunnel was driven 30 feet a day at a cost of \$237 per foot. The Arlberg tunnel was driven 36 feet a day at a cost of \$178 per foot.

ARSENIC is not produced commercially in the United States. This country imports from 5,000,000 to 7,000,000 pounds annually. White arsenic wholesales in New York at 4 cents per pound; red from 7 to 8 cents. San Francisco prices are slightly higher.

THE Idaho Supreme Court has made a decision to the effect that a notice of location which fails to tie the claim to a permanent landmark is void. The decision is said to have an effect on the validity of a large number of claims which were supposed to be located properly.

THE installation of a water power plant is more costly, as a rule, than the installation of a steam plant of the same horse power. The rule does not always apply, particularly on the Pacific coast, where it is possible to get high heads of water. The cost of operation is almost invariably lower with the water power plant.

THE temperature of the cyanide solution influences the solution of the gold. A temperature from 90° F. to 100° F. seems to accelerate and increase the amount of the solution. In working in winter the temperature of the cyanide room and of the solutions should be kept up to keep the solution at its highest efficiency and to prevent freezing.

A COMMONLY EMPLOYED VELOCITY of flow for water in a pump drive pipe or water column is 8 to 10 feet per second. The diameter of the pipe is calculated from the quantity of water to be delivered per second by the pump. The simplest way to ascertain these elements is to consult the graphic table that appears on page 215 of this number.

IN the U. S. Circuit Court of Appeals at San Francisco a decision has been rendered in the scrippers oil case, confirming the decision of the lower court, which decided that scrippers could not locate on oil lands, thereby ousting bona fide mineral claimants. One of the Justices dissented. The case, it is said, will be appealed to the Supreme Court.

IN the case of Tyrrell vs. Cooley, in Nevada county, Cal., the court held that the railroad patent under which the latter claimed title was erroneously granted, the land being well known mineral land, including the Lincoln mine, at the date of the grant. The decision which gave title to the land to the plaintiff, gave the defendant the right to cut and remove the timber from the surface.

HOT compressed air is said to have been used with success to start a petroleum well flowing, after steam and compressed air at atmosphere temperature had failed. The failure of the latter was probably due to its cooling under expansion after leaving the air pipe, thus tending to freeze the petroleum in immediate contact with it. The hot compressed air expanding did not cool down to a temperature which would tend to solidify the petroleum, but, possessing an excess over atmosphere tem-

perature after expanding, it softened the petroleum so that it would flow.

EXPERIENCE with tunnels driven under the sea or lakes has tended to sustain the opinion that the sea ooze and fine silts settling in undisturbed water have so caulked up the crevices and seams that the danger of water breaking in while excavating is not particularly to be feared. Where explosives are used the tunnel cutting should be well below the bottom of the water, so that the seams are not opened up.

THE gold in the Shasta county, Cal., granite that did not make a mine, though it made quite an excitement on discovery, was in all probability deposited as a replacement by precipitation from surface or spring water having gold in solution. The deposit was quite shallow—2 or 3 feet—and only a few feet wide. Its length was 200 or 300 feet, and the surface had the appearance of being an old water channel.

AS TO the action of lime on quicksilver, a solution of lime will clean it and accelerate action. The amount to be used and the strength of the solution must be largely governed by the amount of impurity in the quicksilver. Regarding the loss of quicksilver in mills, the average loss is about one-tenth of an ounce per ton of ore milled, although in many cases the loss is a great deal more. It varies, according to the character of the ore.

THE discoverer, owner or operator of a mining claim to which he has a U. S. patent has a right to follow the dip of the vein under agricultural timber land, if his is the senior title—that is, if his patent antedates the patent or possessory right of the adjoining agricultural or timber land; but if the patent or possessory right to the agricultural or timber land is of a date preceding that of the mining claim, the owner of the latter has not such right.

TUNNELS to cut a ledge bearing copper sulphide ores at great depths below the upper mine openings are not good mining practice. Experience has shown that the copper sulphides frequently occur in lense-like masses in the main body of iron sulphides, and that these lenses are richer and more extensive near the surface. A tunnel run to open up such deposits at great depth has too many chances against the copper being there to justify the risk.

FIFTEEN test cases brought by the Coal Owners' Association of England against individual leaders of the miners' organization for the action of the unions in stopping work in the mines to keep up the price of coal, and consequently of wages, based on a sliding scale agreement, have been decided by awarding small damages to the employers. The court held that workmen, though giving notice of intention, have no right to stop work with the object of restricting production.

THE cost per cubic yard by hydraulic mining at the North Bloomfield, Cal., mine was 6.25 cents. Some hydraulic mines, notably those at Dutch Flat, Cal., and on the Klamath river, have paid dividends from mining that only yielded at the rate of 3 cents a cubic yard. The limits of past results are so far apart that averages from them are not a guide to conclusions. A proposed hydraulic mining operation must be estimated on very much as if it was the first to be undertaken.

THE size of track rail to be used in a mine is not an arbitrary matter. A T-rail lighter than twelve pounds to the yard is not, however, advisable. A weight of over thirty pounds to the yard is not necessary unless using large locomotives and heavy carloads. In the drifts of a copper mine where there is much mine water it may be profitable in the long run not to use T-rail at all. For the track in such mines a wooden rail with a flat iron strap may be the preferable construction.

RIVER MINING CLAIMS for dredging where the banks of the stream have been meandered in the United States public land survey are not on public land of the United States, and the requirement of the United States mining laws would not apply. This at least would seem to be the deduction from the commissioner's ruling in the case of some Rogue River, Or., river claims, which were refused consideration by him and the applicants referred to the State of Oregon as having jurisdiction.

THERE is no law in California, nor in any other State, known to "Concentrates" requiring the underground openings of a mine to be surveyed and platted and filed in a public office. Some European countries have such laws. In Russia surface placer workings for gold and platinum are all platted in advance of opening and filed. A government record of each mine is kept, going into such minute details as the location of piles of overburden removed to get at the gold-bearing ground, and of the piles of washed tailings.

THE rate allowed for time expended in doing the \$100 annual assessment work on a mining claim, as decided by the courts before whom the question has come, is the common rate of miners' wages in the district. In California the courts have said \$3 a day is the rate. In other States there have been other rates established. A court recently took into account, in fixing the amount of work done, the special difficulties in the particular case before it, and made an allowance for the cost of packing in supplies, holding that it was money expended in work.

ASSAYING can be done somewhat more cheaply now than a dozen years ago, using power devices that save hand labor and with furnaces and other devices that save time by doing more assays in the same time; not necessarily doing a single assay in a shorter period of

time, but the elements of care, skill and knowledge that the assayer employs have increased rather than lessened. An assayer's charge for his work is more to be questioned if very low than if it seems high. The assayer is entitled to pay for what he knows, as well as for the physical work he does and the material he uses up.

FOR very long railway tunnels where great difficulties are encountered in securing ventilation during construction and subsequent operation, the preferable construction would seem to be to make two parallel tunnels, connecting them at short distances apart by cross gangways. The one of the two to be used as the air conduit for the other can be made in the same dimensions as the heading or leader cut of the railway tunnel unless a double track line is planned. In this case each of the tunnels is built to take one of the lines.

A HYDRAULIC MINING PLANT is being used to fill in tide lands at Seattle. The ground hydraulicked consists of city property, which it is desired to grade down. Water is pumped from Lake Washington to a reservoir at the top of Beacon Hill. From the reservoir it is conducted in a 30-inch main 4500 feet long, thence in two 18-inch branches, one to a giant and the other to feed the ground sluices. The piping will be done with 220 feet head. The ground hydraulicked is sand and light gravel, which washes readily. Sluice boxes on trestle bents distribute the filling over the flats. The capacity of the plant is about 50,000 cubic yards daily.

DEATH VALLEY, in Inyo Co., Cal., contains a large number of mineral deposits that will ultimately be commercially utilized. These include borax, salt and nitrate of soda. There is one bed of salt over which the old road from Mohave to the borax works is built that is 5 miles across. Borax exists in beds in old marshes and in deposits of colemanite in the bordering hills. The nitrates are in the bordering hills. The valley has one fair-sized living stream, Furnace creek, which provides water for the old borax works and to irrigate twenty acres of alfalfa, from which a cutting was made every month. Trees, except mesquite, could not be made to grow, the fierce heat destroying them.

A DRIFT is a term generally inclusive of all horizontal mine openings. In a more restricted but common use it is a horizontal mine opening of dimensions convenient for working out the rock and for use for transportation or travel after completion. Where it has its start at a station it is termed a level; if at about right angles to the trend of the ore body it is called a crosscut; if outside of but parallel to the trend it is sometimes called a gallery. Working horizontally in the ore body wider than a track and passageway, as in a drift placer mine, the entire opening would be called a drift; the face of rock, ore or gravel being mined would be a breast, and the track and manway opening through the drift would be a gangway.

IN the Calaveras county, Cal., case the trial court decided that a placer location was valid even if the requirement that it should be a legal subdivision of the public land survey was not followed. The decision has been appealed from. Department rulings on the requirement have not been uniform. In one case, where the Department at first refused to issue the patent, by reason of the non-conformity with this requirement, it subsequently, on a second rehearing of an appeal, allowed the patent, giving as a reason the appearance on the deputy mineral surveyor's plat of a corner of an unsurveyed claim which would prevent the full appropriation of the legal subdivisions of land that should have been designated in the application.

IN providing power for pumping water through a line of pipe, provision must be made for power to balance the friction head for the discharge, the velocity head, and the entry head, as well as the head due to the difference of elevation between the inlet and the discharge expressed in another form. The total head to be overcome by the power would be the sum of the entry, velocity and friction heads of the same quantity of discharge from the pipe, with the direction of flow reversed, plus the difference of level between the inlet and discharge. Only the last seems to be considered in most of the discussions on mine pumping. The three heads noted have a variable sum, dependent on the elements of the pipe through which the pumping is effected. A corresponding variable amount of power is required to overcome these variable heads. The practice seems to be to charge this power as a loss of efficiency in the pumping engine. Really this head should be credited to the pumping engine as part of the work it is doing. With this correction made, the percentage efficiencies of many pumping engines would make a much more creditable showing. How considerable this additional power required may be is illustrated by this problem: What effective power is required to deliver by pumping 30,000 gallons of water in twenty-four hours through a riveted sheet iron pipe 4 feet in diameter to an elevation of 500 feet? The velocity of flow required to make the delivery is 4 feet per second. The entry head for this velocity is .125 foot, the velocity head is .25 foot, and the friction head—by Weisbach's formula .1437 foot per 100 feet—is 49.5 feet for the total length of the pipe. The sum of these is 50 feet, to which the difference of elevation—500 feet—added makes 550 feet of head against which the water must be lifted by the pump. The amount of water to be lifted per minute is 173,750 pounds, which for 550 feet amounts to 95,562,500 foot pounds. This divided by 33,000 gives 2895 H. P. of work, for which, at 70% engine efficiency, there is required in the engine 4135 H. P. effective.



## Deliveries.

Written for the MINING AND SCIENTIFIC PRESS by C. H. FITCH.

I would like to give your readers a heart-to-heart talk on deliveries, because I think it will make for good.

Most of the grief in this world comes from expectations which are lifted unduly high only to be dashed to the ground. Philosophy tries to remedy this weak indulgence of human nature. We are told that "Hope tells a flattering tale, delusive, vain and hollow, but let not hope prevail lest disappointment follow." But hope for the moment is too sweet a thing to be slighted, and we allow it to take the very front place in the procession, whatever devils may "take the hindmost." Again, we are told that, if we can not have our desires long, we have our remedy by cutting them short—a cruel process of vivisection, however, when they have grown to be part of our ideal selves.

But where philosophy proves futile, the drill of education proves beneficial. Men are notably children of larger growth. A bawling baby, a snarling or ugly boy, a peevish or cynical man, are not quite the same as a crowing baby, a brave and amiable lad or a man of large and generous motives. An important determining cause which throws a person into one or the other of the above classes is educational drill. If the drill is bad, it is a course in lying and false expectation. The habit is formed of claiming too much in everything and being habitually called down in mortification, so that the person's experience becomes that of one who looks out of too large a self-esteem into an always ensmallled and belittled appreciation by others. Early flattery, the indulgence of weak mothers and an easy yielding to mean and whining methods of gettings things are bad drill.

But good drill is true and prompt. Its word can not be swerved, and, if the word is insufficient, a whack of punishment follows immediately. It begins with low pay and hard knocks and inflated self-consequence to have the wind taken out of. So the man gets a habit of working hard for better results, and when a little appreciation comes it is very sweet and causes him to redouble his exertions. After that the future always seems to expand close before him; he is called up, instead of down, and, if he should be rebuffed, he has got a liking for the game of going up against difficulties, and pushes all the harder in the modest and good-natured persistency in which he has been drilled.

Three steps in the business of marketing mining machinery are inquiries, orders and deliveries. Inquiries are fished for at considerable expense. They cost several dollars apiece even when obtained by advertising in the best available papers. In others they cost \$30 or \$40, and in some cases \$300 or \$400 are spent without getting a single traceable inquiry. At these prices an inquiry should be held precious; but we are criticised for not giving them better attention. This is because many of them are not in our direct line, or do not mean business. In fishing for black bass we find shoals of little fish called "conners," which do nothing but take the bait off the hook.

Having happily got a good inquiry—a good nibble—we are on the alert with every instinct of the ardent fisherman to land an order. Ex-President Cleveland may make his best apology for the Waltonian pastime, but fishing for business needs no apology. It is easily ahead of the frivolous sport of torturing the lower creatures and dragging them out of the element in which the good Lord placed them. Fishing for business is more earnest, more absorbing. Rightly done, if I may continue the analogy, it conveys a blessing upon the fish, and leaves him in the swim.

Our anxiety to get orders leads us to take very sanguine views of deliveries. We go on the wrong principle of education both for ourselves and our customers, and are so frequently found liars that it comes to be regarded as a bad matter of course. It is a hard, slow way of getting business to tell a man you will ship his mill in six months, when a competitor stands ready to promise shipment in thirty days, get some of the customer's money, and then stand him off seven months with narratives about strikes and breakdowns.

I hold the customer to be responsible, with the manufacturer, for this state of morals. He wants so much for his money, quick and easy, and so underestimates the expense, time and difficulty of putting a mine on a paying footing, that it is in some cases impossible to do business with him on the basis of true values and representations. There is the large end first, the roseate prospectus, the fortune to be picked up off the ground, then comes the chill of assessments and hope deferred, and the looking toward small and disappointing realities. In this frame of mind everything goes wrong, and there is a strong temptation to unload the anxiety by dishonest means.

Yet to a sane, educated investor all may be right. He knows what to expect—that it takes time and money to develop a mine. Things are coming along as rapidly as could be expected. He has taken the time and expense to prove that he has something

more than a dream mine, and that the dividends are only a matter of steady work and patience. For him there is no gall or disappointment about it.

Some may possibly say that this moralizing about deliveries is useless and impracticable, that people are, like Barnum's patrons, wanting to be fooled, and continuing to insist on unreasonable expectations and miserable consequences. I do not agree with this. Many an investor, indulging in too sanguine expectations, has the sense to read this paper, reflect upon what he reads and make safe his judgment. Good morals are stronger than steel. Wherever there is a great industrial success, there are good morals, and where we see the rusting machinery, the deserted shaft house and the dismantled mill, we see, as plain as the printed page, a history of departure from honest realities. Let us be more exact in our expectations, for a man with a false hope is looking to the bad.

A manufacturer's chief concern is to keep his shop busy. He would sooner be overcrowded with orders and keeping his customers waiting than short of orders and letting his men go. This makes him over-anxious to clinch a good order by sanguine promise of delivery. We may have to make some concession to moral imperfection. The other evening I bought a basket of fruit of a vendor and found large, ripe peaches on top and small, green peaches at the bottom. Next morning I called him to account, starting in with the inquiry:

"Do you call yourselves honest and reliable people here?"

The old man eyed me cautiously and answered: "Only moderately so."

There is one thing more that can be done about deliveries beside the endeavor to "moderate" our lack of virtue. That is to anticipate our wants, have foresight and get our orders in early. It is just as easy for a mine manager to ask himself: "What will I need in March, 1902?" as it is to ask himself: "What do I need now?" This is not a little thing. It is a point in good morals running through the entire industrial series. The manufacturer will then have his facilities ready in time, his supplies and materials purchased, his men assured of employment, and can give reliable promise of delivery.

Another point I make is that of co-operation. This foresight on the part of each mine manager will not only best serve his own immediate purposes, but will put the whole country in better running condition. Why ignore such a point as this, when it is precisely such co-operation that makes the United States more prosperous and wealthy than, for example, Madagascar?

## The Second Turbine Wheel Pit at Niagara Falls.

The second wheel pit of the Niagara Falls Power Co. at Niagara, N. Y., has a length of 463 feet 8 inches, a depth of 173½ feet, and it is 18½ feet wide. The tunnel extension to the new wheel pit has been excavated, brick-lined from end to end, and connection between the brick lining and the tunnel and the pit has been made. Many of the castings for girders, streets, etc., have already been placed in the walls.

In the construction of the second pit the engineers are said to have met the same conditions of rock and water that were found in the first pit. From the top to the bottom the nature of the rock changes four times. The inflow of water through seams in the rock was practically the same as was met in the first pit. This water was caught in a "ring" 60 feet down and then pumped to the surface. This "ring" is practically a reservoir excavated in the sides of the pit. Into it flows all the water that comes through the rocks above. When the pit is completed and the installation placed, the water that flows into the "ring" will be conducted to a point below the turbine deck, and there pass into the tunnel, and through it to the lower river. In the new pit, as well as in the old, care has been taken to see that the pit is fully drained. The pit is to be lined with brick from top to bottom, the rear course hollow in order that inflowing water may be caught and conducted to the tunnel.

The tunnel extension of the new wheel pit is nearly 700 feet long, and runs in a curve from pit No. 1 to pit No. 2. It is of the same size and shape as the original tunnel, which is that of a horseshoe. It has been lined with brick, the first eight courses and the inverts being of vitrified brick, and the other portions of what is known on the work as "tunnel hards."

Six chambers have been excavated in the west side of the new pit. Each of these chambers is 18 feet wide, 21 feet high and 50 feet deep. It is probable that oil and air pumps will be installed in them, and also the exciters for the mammoth dynamos that will be operated in the power house. The chambers are 138 feet below the surface.

The capacity of the station will be 55,000 H. P., made up of eleven units of 5000 H. P. each. The turbines in the original pit are of the twin type, while those in the new pit will be single wheels of the inward discharge type working under a head of 145 feet. The turbines in the original pit work under a head of 136 feet.

The forebay, which will be covered, will be 460 feet long and 40 feet wide. Its outer wall runs along the inlet canal, and in order that the water of this canal may pass into the forebay twenty-four arches have

been built, the top line of which is under water. Back about 10 feet from the arches are the racks. The outer wall of the forebay is expected to keep back the floating ice in the inlet canal, while the fact that the forebay is covered, will be a protection to the men employed there, and also from the severe weather of winter time.—Electricity.

## The Electrical Burner for Blast Furnaces.\*

By F. L. GRAMMER.

In these days, when anthracite is less extensively used as a blast-furnace fuel than it was a generation ago, and managers endeavor to maintain regular and known ore mixtures, the "freezing" of tuyeres, cinder notch or iron notch is infrequent, and, consequently, the oil burner or "kerosene blowpipe" is seldom employed, and furnace foremen have, to a considerable degree, forgotten their former cunning and persistency in the use of the drill and sledge. Still, in starting new or abandoned plants with untrained labor, and in running some of our large 100-foot furnaces, slips, resulting in very cold furnaces, may occur, even under experienced managers.

During my superintendence of the Cleveland, O., blast furnaces, such a misfortune, owing to a dearth of trustworthy foremen, was experienced, and our electrician, Thomas Martin, proposed to open the tuyeres and cinder notch by means of the heat of the electric arc. We have heard that the surface cracks or marks developed in rolling heavy plates have been closed by electric welding, as by a soldering iron, and also that an electric burner has been employed at some German blast furnaces; but the experiment was quite novel to us, and I think it constituted one of the first, if not the very first, successful applications of this device, for the purpose named, in the United States.

In the construction of the circuit we attached one wire to a pipe, feeding a cooling block of the furnace wall, some distance from the point where the burner was applied. The current from this wire passed either through the crucible or through the circumferential shell. The other wire, after running through a resistance coil immersed in a barrel of water, was attached to clamps holding the carbon, the latter being inserted in an iron pipe provided with a wooden handle, and applied at the desired point by the goggled operator.

Our first experiments were not very successful. We used 1.5-inch carbons, 1.5 foot long, not being able at the moment to obtain larger ones. Subsequently, we had carbons made 4 and 6 feet long, and with these we burned a hole through 18 inches of cold iron in five minutes. A current from 400 to 500 amperes did the work; but 1000 amperes (at 80 volts) gave better results. Our two dynamos were Genere Electric, with 110 K. W. capacity and 220 volts. We reduced the voltage by means of a resistance coil of German silver wire.

The results were so satisfactory that permanent wires were strung up to the furnaces, and "hard holes" at tapping time, requiring slackening of wind, are now an evil of the past.

Water blocks sometimes leak and flood a side of a furnace, closing several tuyeres and causing one-sided working. But, by putting blanks on the peastocks temporarily out of use, the blast can be kept on the furnace while the closed tuyeres are burned open. Several furnaces on the Lake fronts used it successfully, after hearing how it had assisted us.

The electric current employed is not dangerous to the workman, and the apparatus, unlike the oil blowpipe, is always ready for service. It can be applied instantly to a black, cold surface without the need of any blast pressure—a boon which will be appreciated at single stacks, where the freezing of the tuyeres may have made it difficult to get the necessary pressure, by affecting the gas supply to the boiler house.

The saving in oil, worn-out men, drills and time, commends this simple and effective burner as the best.

Plants not equipped electrically can use the power of a neighboring municipality or other works, employing a rotary transformer to obtain the desired current.

Both the holder of the burner and the curious spectators should wear the darkest glasses, such as are worn by heaters, or twelve hours of great suffering will be the penalty.

\*Trans. American Inst. Min. Eng., Mexican meeting, Nov., 1901.

## Graphic Table, Weisbach's Formula Flow of Water in Pipes.

The graphic table which appears on the opposite page was made by Mr. D. E. Bigelow and published in this paper as prepared by him in the issue of August 24. It has proved so practically useful, and so frequently called for by our subscribers, that it is republished, with some changes in the text which make it even more directly serviceable.

The units of quantities of water flow in common use are gallons per minute and cubic feet per second. Mr. John Richard has changed the cubic feet per minute on the original table into equivalents of gallons per minute, and loss of pressure in pounds per square inch is denominated friction head.



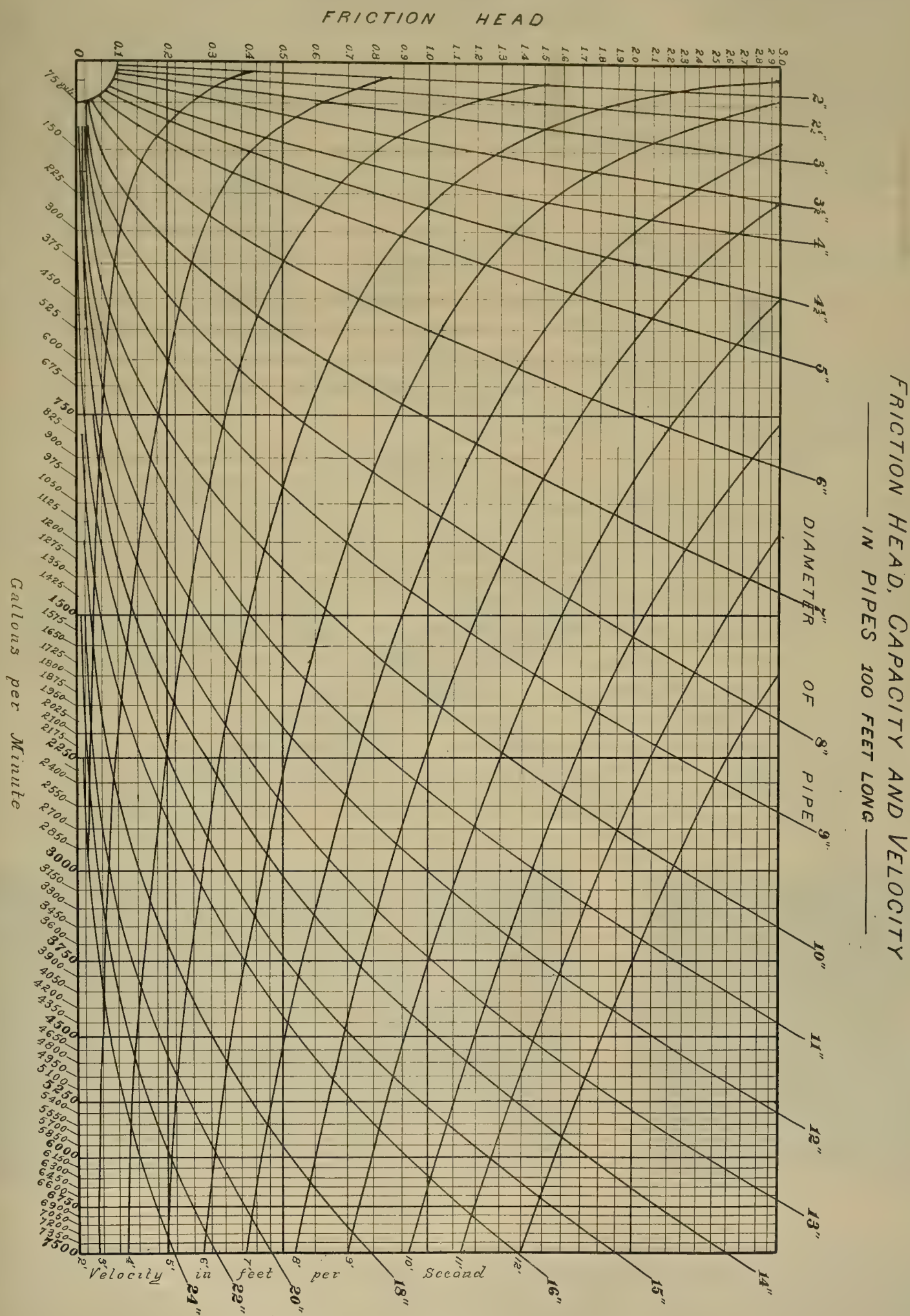


Diagram by D. E. Bigelow, C. E.  
Berkeley, Cal.

Rearranged by J. Richards, San Francisco.



## Late Gold Dredging Practice.\*

NUMBER IV.

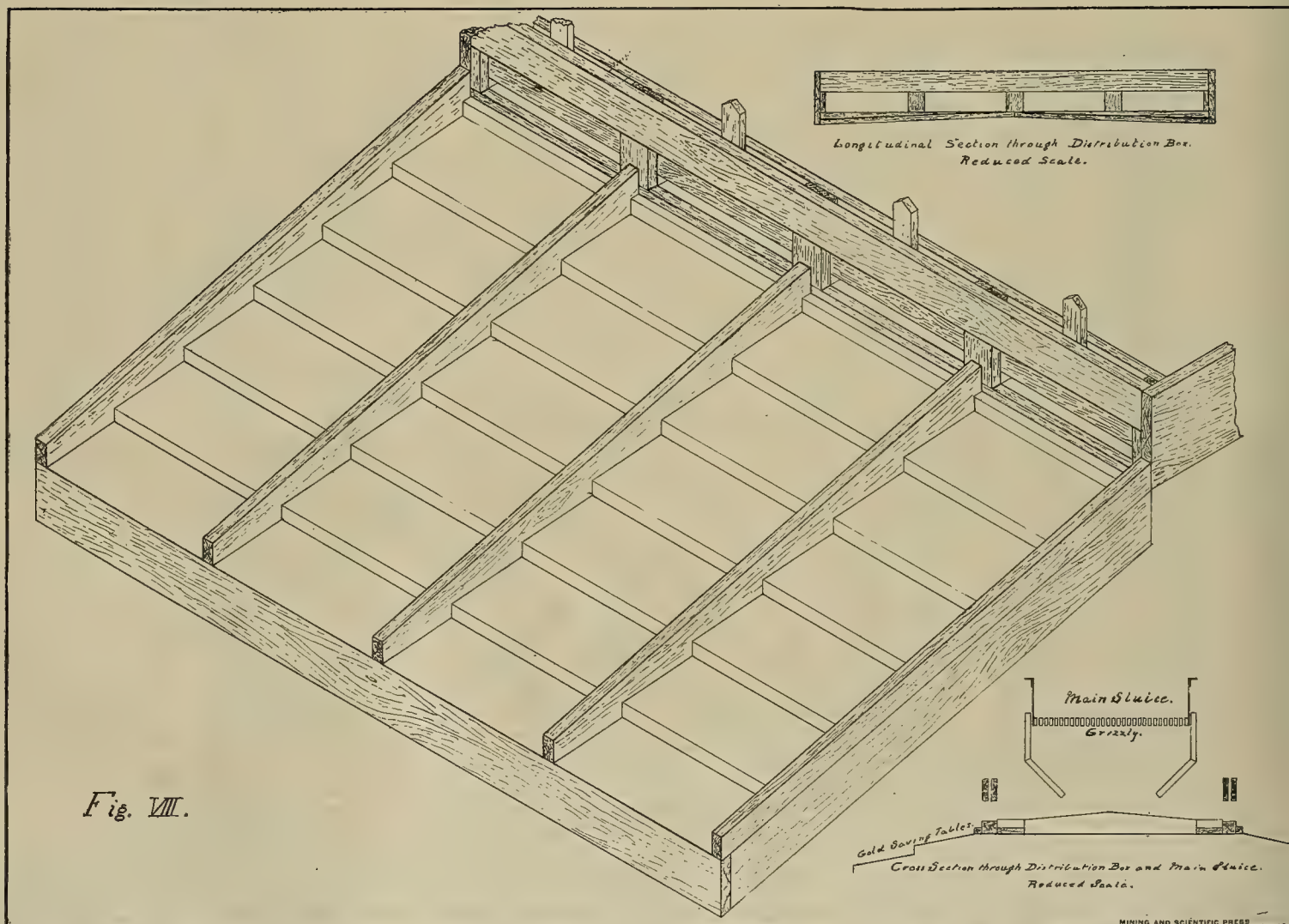
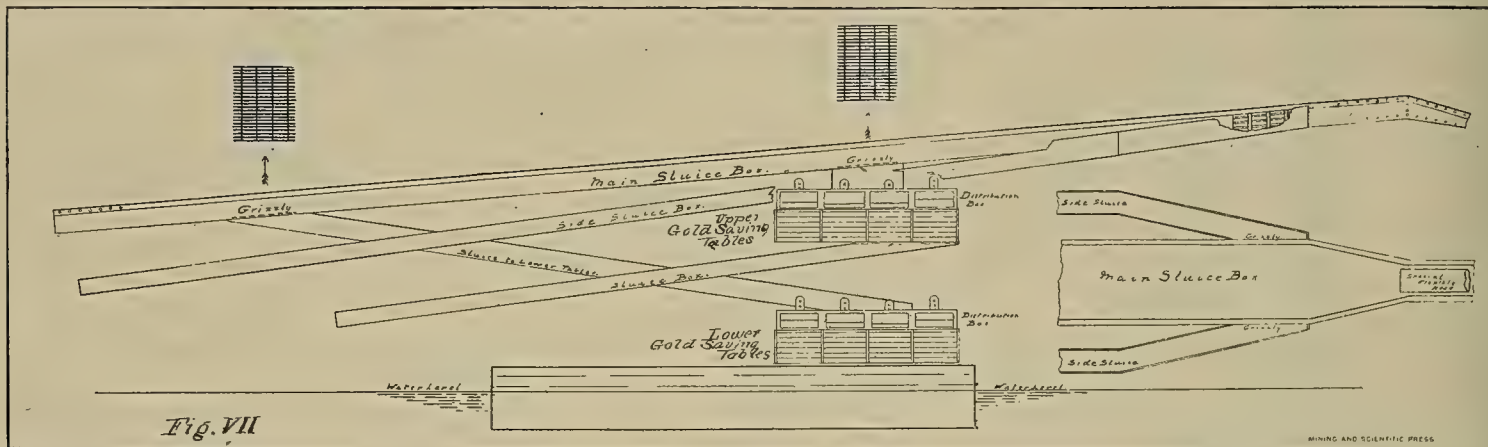
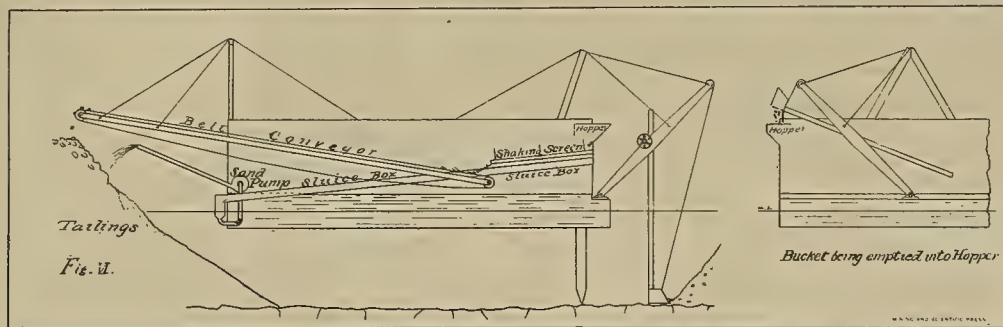
Written for the MINING AND SCIENTIFIC PRESS  
by RALPH L. MONTAGU.

There is another type of dredger that is in operation. This is known as a dipper dredger. (Fig. 6.)

wards fills up the crevices; but where this process is reversed, there is a large volume of hollow spaces between the boulders; therefore the tailing pile is higher in the latter than in the former case, and this necessitates raising the dumping point of the tailings.

The suction dredger has been tried, but was not successful. In this type the ladder and bucket chain were replaced by the suction pipe of a centrifugal

the depth to bedrock averaged 6 feet. The dipper was specially constructed so as to dump into a hopper 14 feet above bedrock. A sluicibox was supported on small flat cars running on a track parallel to the dipper; water was supplied to the sluice through a flexible pipe. The dipper dredger, as used in placer mining, delivers a bucketful (1½ cubic yards or more), and then, after an interval, another bucketful. This requires that there shall either be a considerably greater flow of water to sluice the same amount of material in the same time as the elevator dredgers require—where the gravel is dumped in small quantities continuously—or that there shall be a larger screen area in order to hold back the gravel and feed it steadily on to the tables or sluice and stacker. This fact was thoroughly illustrated in the case to which I have reference. There was sufficient water to sluice, proper provision of screen area being made, but not enough without it to carry off the intermittent amount of gravel dumped by the 1½-cubic-yard dipper, the sluice box continuously choking up. The lower end of the sluice box was, if anything, rather below than above the level of the ground, and, as the wash more than fills the space from which it is



The gravel is dug by the dipper, which dumps into a shaking screen. The fine material is carried over a series of tables and finally deposited by means of a sand pump; the coarse material is conveyed aft and stacked in the manner shown.

The tailings in this case and in the preceding one take up more space than in the two first-mentioned types, because where the coarse boulders are put on the bottom, the fine material being deposited after-

pump, which discharged into a sluice box. Boulders caused a lot of trouble; only a small percentage of the gold in the gravel was elevated, and the dredger was changed into the elevator type (Fig. 1) and then handled the ground successfully.

A dipper dredger, to work on bedrock, was installed in Wyoming, but was not successful, because, so the manager reported, "there was not sufficient water or grade to carry off the tailings." In this case

excavated, this caused the tailings to pile up and cause trouble.

Other conditions being the same, it is better to have the dredger floating than to have it resting on bedrock. In the first case there is no track or foundations to be constantly laid ahead; but in the latter this has to be done and adds to the cost of mining.

GOLD SAVING DEVICES.—The most important part



of any mining venture is the successful extraction of the gold contained in the deposit. The specific gravity of gold is much greater than that of gravel or water:

|             | Weight per cubic<br>inch—pound. |
|-------------|---------------------------------|
| Gold.....   | .700                            |
| Gravel..... | .090                            |
| Water.....  | .036                            |

Therefore if a body of gravel is carried by a flow of water down an inclined plane in which there are depressions the gold will settle in these depressions, although the water would carry the gravel over them. In placer mining the inclined plane becomes the sluice box, and the depressions are termed riffles. In a state of nature gold is found in various

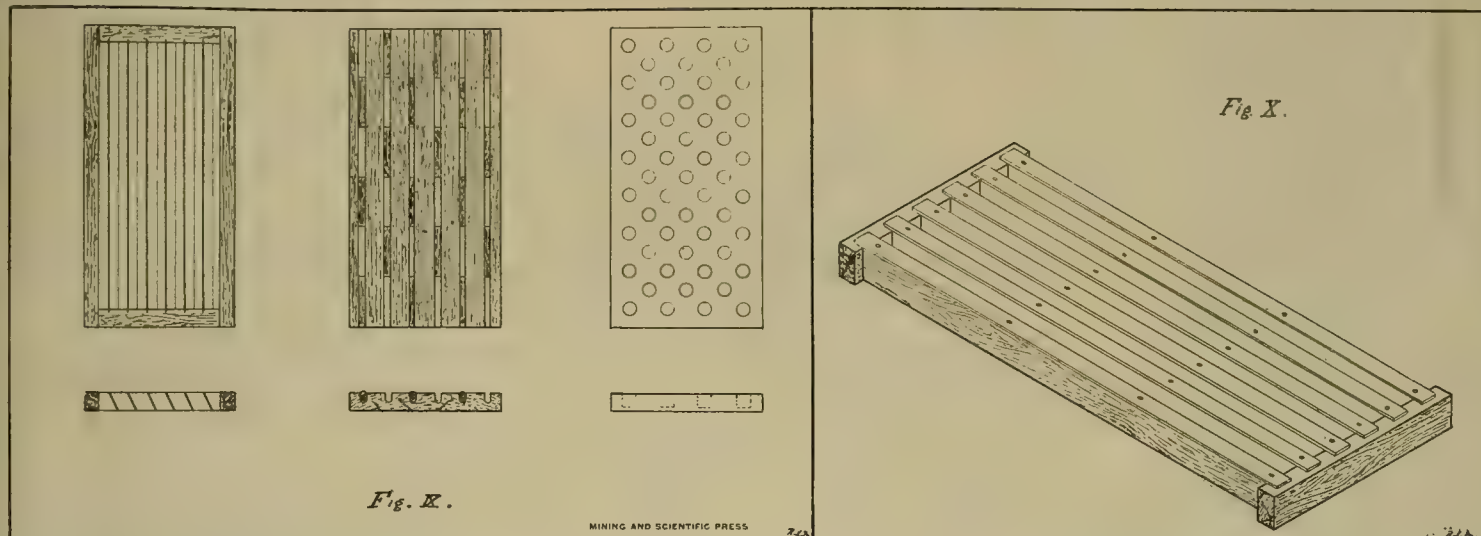
accomplish this, for use with dredgers of types 1 and 2, is shown in Fig. 7. When the gravel and water are elevated by the same centrifugal pump it is impossible to regulate the flow of water according to the amount of gravel passing through the sluice. The pump should be run at a speed just high enough to impart a velocity to the water sufficient to lift the gravel. Water discharged from a pipe onto an inclined plane has a tendency to spread in a lateral direction in a certain ratio to the rate of discharge and the angle or grade of the inclined plane. Just below the discharge point a set of grizzly bars are put on the sides of the sluice, and two smaller auxiliary sluices with a heavier grade than the main sluice are fed through these bars. Although the grade in the side sluices is greater than in the main sluice

of side screens lower down in the main sluice and carry the material from them into the side sluices at this point.

If the gold is so light that a high percentage of recovery is not effected by these means, it would be advisable to adopt an arrangement similar to that used by the Risdon Iron Works on their patent gold saving machinery.

(TO BE CONTINUED.)

In a process devised by J. G. Rhodin, of Manchester, England, for manufacturing potassium salts from feldspar, the feldspar is finely ground and mixed with slacked lime and sodium chloride, the mixture being subsequently heated to 900° C. By this means about 85% of the potassium in the feldspar



forms. In some gravel deposits the gold is rounded in form; the particles are like small shot that has been worn into various shapes and sizes. This is termed coarse gold, and this settles readily in any light depression; but in other places the gold is found in very light pieces that may be large but are very thin. Gold of this description will not settle as readily in the depressions or riffles, and consequently the flow of water must be checked. The grade of the inclined plane has to be reduced and the recovery of this class of gold becomes a more difficult problem in proportion to the fineness of the particles.

In places where the gold is coarse and dredgers similar to Figs. 1 and 2 are used, ordinary riffles placed in the sluice box have been found to be all that is necessary. These riffles are made of wood and are protected by strips of Norway iron spiked on to the exposed surfaces to prevent wear (Fig. 10). It is not advisable to screen the gravel finer than 4 inches on dredgers of these types (Figs. 1 and 2), and in localities where the gold is fine additional screens have to be introduced into the sluice box. The fine material from these screens is spread over tables in order to cut down the velocity of the water and to

provide sufficient area for the proper settlement of the gold.

An arrangement of sluices and tables that will box, the velocity of the water is considerably less.

There are two sets of grizzly bars placed in the bottom of the main sluice, and the flow from these points is led to the distribution boxes, having movable gates at the sides in order to regulate the flow evenly over each section of the tables (Fig. 8).

There are riffles placed in the reverse sluice leading from the lower grizzly to the lower tables, and also in the sluices from the upper tables.

Various methods of making the riffles for the tables are shown in Fig. 9.

The choice of these, and likewise the distance the various grizzly bars are apart, must be governed by local conditions.

I have not attempted to show the various supports for tables and sluices. These the engineer can design for himself.

It may be necessary to put in a current spreader in the main sluice opposite the side screens, and, provided gold is not found in the side sluices below a certain point, it might be a good idea to put another set

is extracted in the form of potassium chloride. It is stated that the process is very cheap and is well adapted for commercial purposes. It is proposed to carry out a series of further experiments with the process prior to erecting a factory in Sweden for the manufacture of potassium salts on an extensive scale. Another prominent feature of the process is that the insoluble residue that remains after the potassium and sodium salts have been extracted by water constitutes an excellent material for glass manufacture by the addition of a little sand and alkali.

The following table shows how many miners' inches of water are required to have a certain head of water for a certain size nozzle:

| Head feet. | MINERS' INCHES |        |       |       |       |
|------------|----------------|--------|-------|-------|-------|
|            | 2-in. nozzle   | 2½-in. | 3-in. | 4-in. | 5-in. |
| 100.....   | 80             | 125    | 185   | 325   | 500   |
| 150.....   | 100            | 155    | 225   | 400   | 625   |
| 200.....   | 115            | 180    | 260   | 460   | 715   |
| 250.....   | 130            | 200    | 290   | 515   | 800   |
| 300.....   | 140            | 220    | 320   | 565   | 880   |
| 350.....   | 150            | 240    | 345   | 610   | 950   |
| 400.....   | 160            | 255    | 365   | 650   | 1000  |

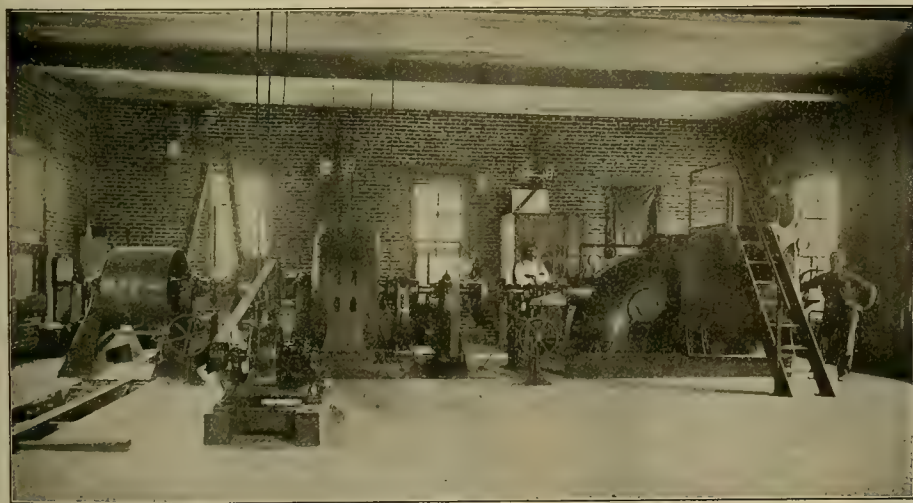


FIG. 1.

#### Walla Walla, Wash., Power House.

In the generating station of the Walla Walla, Wash., Gas & Electric Co. is installed the new hydro-electric plant illustrated here. The plant was put in operation May last, and up to the present time has given 24-hour service without interruption. The water is conducted from a near-by stream through a wooden stave pipe line, 5600 feet long and 4 feet in

internal diameter. The water wheel is 27 inches in diameter and is operated under a head of 90 feet. It is direct-connected by a friction clutch to a 300 kilowatt, monocyde generator. The wheel is a McCormick turbine, built by the S. Morgan Smith Co. of York, Pa., which furnished the hydraulic equipment. The electrical installation was made by the General Electric Co. Fig. 1 well shows the general arrangement of the power machinery. The generator is of the revolving-field type and is operated at 450 revolutions per minute. The end thrust of the wheel is



FIG. 2.

taken care of by lignum-vitae stops, one set in the wheel case and the other in the discharge pipe. The wheel is fitted with a Replogle relay governor, as better shown in Fig. 2. At the left end of the driving shaft will be seen a wide-faced pulley, which is connected to the generator by a friction clutch. This is to provide connection for a 400 H. P. steam engine, which is not shown in illustration. The engine is installed only as auxiliary, to be used in case of accident to the water power. The plant is situated 5 miles from center of distribution.



## Notes on Portuguese East Africa.

Written for the MINING AND SCIENTIFIC PRESS.

This is the country lying to the east of Rhodesia and the Transvaal, and the gold region lies 18° S. and 33° E., with Massi Kessi as the center. It is reached by railroad from Beira, a seaport north of Delagoa bay.

Massi Kessi, or more properly Macequece, is situated on the River Munene, some 2500 feet above the sea. The climate is tropical, malarious and very unhealthy. Horses or cattle will not thrive or live. Donkeys imported from Zanzibar are the only animals that thrive and they are very expensive. Some transport is done by oxen, but most of it is done by negroes and their capacity is wonderful. Most of the negroes are well proportioned and heavily muscled; they work well when properly supervised, their ration consisting of two pounds of rice a day, with one one pound of canned beef (from Chicago) a week, and their wages are equivalent to \$5 to \$10 per month.

The natives do some cultivation at their kraals and raise mealies (Indian corn or maize), pumpkins, cucumbers and potatoes.

The native houses are picturesque; they are made conical; built of bamboo, daubed with mud and thatched with grass and reeds, they are cool and shed rain well. Their clothing usually consists of a loin cloth of limbo or calico. All the labor employed is native, with white overseers.

Some 4800 claims of 1 hectare each have been located; about 1000 have been taken up for alluvial and the remaining 3800 for reef working—a total of nearly 10,000 acres.

Workings of more or less important character have been carried on, especially ancient mining of most extensive nature. These workings, as shown by thousands of old shafts, open quarry like, and other workings are known to extend over some 20x15 miles. Some of this work was undoubtedly of Phœnician origin; but in the year 1575 an ordinance of King Sebastao tells the Governor of Sofala that he must see to it that the output of gold from that town shall not decrease—as seems to have happened just then—and that he must take necessary measures to have it increase to what it had been for some ten years previously.

Statistics show that Sofala used to be a shipping point for gold dust, and it must have come from those Macequece gold fields.

A gold piece was found at Inhanga, bearing the date 1580, and is proof of the presence of the Portuguese.

No tools of European make have been discovered, but at the Mudza river, at a depth of 9 feet, a Kafir hoe was discovered, the iron part of which was nearly eaten away by rust. It is believed that when the Portuguese first arrived in East Africa they found the gold industry already established in the country by the Arab traders, or by people from India, and the gold from Manicaland was exported from Sofala.

On the left bank of the Mudza a fort was discovered built on the plain, but close to the mountains, which was evidently destined for the protection of a considerable number of people occupied in the large workings that extend for a radius of some miles. These workings consisted of shafts some 4 feet in diameter and in many places not more than 10 feet apart.

The gravel was hoisted up, carried to the river and probably washed in wooden bowls. Very little attempt at drifting or timbering was made, only the gravel in the immediate vicinity of the bottom of the shaft being removed. In this particular section the ground was fairly honeycombed with these old workings.

The fort referred to was in the form of a parallelogram, some 235x150 yards. The face farthest from the river is built with shales, and about 9 feet in height by 3 feet wide, having a bastion at each corner, built evidently for the use of small cannon, which would indicate that the fort was built by the Portuguese.

Some prospecting work has been instituted on these placers by the Mozambique Company, who hold a charter on this country. The deposit has a depth of from 10 to 20 feet, with 4 or 5 feet of gravel; the top is red loam, bedrock being of talcose schist. Above this deposit a ledge has been discovered, the gold occurring in the schist. Some of the old workings in the reefs or ledges are very interesting, and one shaft on a mine being prospected by an English company was 220 feet deep.

Occasional specimens of native and other forms of copper are found; blende and galena also often occur, while almost everywhere the reef matter is most abundantly mineralized, chiefly with iron pyrites, though sometimes with copper pyrites. Lime is almost entirely absent. Deposits of mica are frequently discovered. Antimony and derivations seem to be practically non-existent, and the quartz is almost everywhere free milling. The gold is very pure.

Developments are being made on the Richmond and Braganza mines by French capital; but, with the ex-

ception of this work, the mines "pegged out" are simply prospects.

The machinery imported has come from England. There is very little serviceable timber, and, owing to the ravages of the white ant, is very little used. Mine timbers are usually imported from America. The food is nearly all canned and imported from England and America.

To sum up the conditions, one may say that mineral exists throughout the region of the Munene, Mudza, Zambusi, Incarra, Chimeza, Revue and Chua rivers, but not in sufficient quantities to cause any excitement.

The climate is very bad. Living is very expensive. The royalty which one has to pay the Mozambique Company is very excessive, and altogether it is a good country to stay away from.

Macequece, Sept. 20.

## Oil Well Drilling With Wire Rope.

The development of oil fields in California last year directed the attention of the American Steel & Wire Co. to the use of wire rope for drilling oil wells. They found experiments of drilling with wire rope had been made in Pennsylvania, but without success. Investigating the reason for failure, they found the lack of spring in wire rope was the principal cause, that experiments had been made with the regular lay of strand the same as used for hoisting purposes, and that no provision was made for the untwisting and recoil of the lay of wire rope when the load of tools was lifted and released.

They claim to overcome the difficulties by a left-hand "short lay" plow steel wire rope, to which they give the name of American steel wire drilling line. The lay in this rope furnishes the required amount of spring for drilling, the left lay automatically turning the tools to the right, keeping the threads tight in the joints of the drilling tools, as all drilling threads are right hand. Their next requirement was a swivel which would hold fast in the right-hand turn and be released in turning to the left, permitting the lay of the rope to spring back into place at the moment the strain or load of tools was released from the rope. They say they have found these requirements in the automatic drilling swivel. They commenced this experimental work early in 1901, and have proceeded slowly, overcoming many difficulties as they arose in the various formations found. They assert that they have overcome every difficulty thus far encountered.

The changing of standard drilling rigs to the use of wire line is a slight expense; the cost of wire line per

speed with wire rope is increased over that of manila, particularly in wells filled with water, owing to the friction of the water on wire line being much less than on manila. In one well cited by the company, 2500 feet depth, 1500 feet of water in the hole, the difference in friction was so great that the drilling proceeded three times as fast as with manila, owing to the increased blow of the tools. In spudding the speed is about the same, but as the hole deepens speed is increased, on account of the quicker action of metal over fiber.

A driller can determine the formation in which tools are working with greater accuracy with his hand on wire line, owing to the vibrations through the metal being more acute than through fiber. The working of the tools is telephoned to the driller through metal to the nerves of the fingers, and then to the brain, with clearness, as soon as the driller's nerves become accustomed to the increased sensitiveness of wave motion through metal.

The American Steel & Wire Co. now have their American steel wire drilling line and automatic drilling swivel, as illustrated, successfully working in the Fullerton and Whittier districts, in the Los Angeles district, in the Coalinga district and in Contra Costa county, Cal.

All drillers who are not using wire line, but who wish to investigate this subject, can get full information by addressing the San Francisco, Cal., or Los Angeles, Cal., office of the American Steel & Wire Co.

## The Humphreys Mill, Creede, Colo.\*

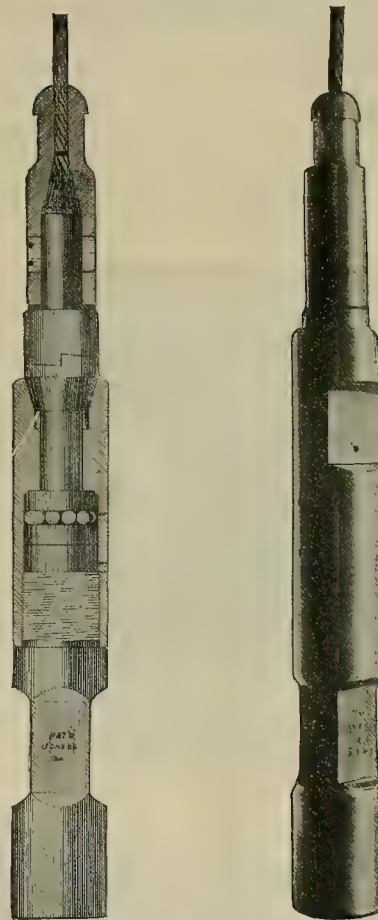
Written for the MINING AND SCIENTIFIC PRESS.

The illustration on the front page is of the Humphreys mill, in process of construction at Creede, Colo., for the Humphreys Tunnel & Mining Co. When completed it will be supplied with ore by electric haulage from this company's properties through the Wooster tunnel. The building when finished will extend 400 feet along the slope of the hill, its height being 200 feet from wheel pit to the top of the crusher floor. The Hendrie & Bolthoff Manufacturing & Supply Co., who designed the plant, are now putting in the machinery, the design and equipment being intended to carry out the most advanced ideas of ore concentration. The construction has been directed by Raymond Whinnerah, formerly at the A. M. & W. mill at Leadville.

The ore is trammed from the ore bin to a grizzly, the oversize from this being handled by a 10x30 crusher. The undersize and the product of the crusher drop into an ore bin, and from this the ore is fed automatically through a sampler into a roughing trommel, thence to two sets of 14x36 crushing rolls. The material is then elevated and passed through two screen lines, each consisting of four 3x6-foot screens. Everything above 16-mesh is handled by four-compartment Hartz jigs. That part of the ore passing through 16-mesh is run to four Bartlett tables. The tailings are reground in three sets of 14x30 rolls, the product being sized by revolving screens, the oversize being elevated by Frenier sand pumps. The pulp is classified in hydraulic sizers and distributed on twelve Wilfley tables. The concentrates from the jigs drop into hoppers underneath the jig floor and are trammed directly from these hoppers into chutes leading to concentrate bins on the railroad track. The tailings from the tables are handled by launders driven by Bolthoff's patent launder head motion. The power for the mill is supplied by water wheels. A 4-foot water wheel with Replogle governor drives the Wilfley tables and electric lighting plant. A special 6-foot wheel drives the heavy crushing machinery. The power from this wheel is transmitted to the different bents by Manila rope drive. The mill is heated throughout by the Sturtevant system, consisting of steam heater, fan and one central galvanized air duct, distributing the heated air to all parts of the mill. The steam for the heater is supplied by a 50 H. P. boiler. The concentrates are conveyed, in the manner set forth, to six bins in the lower end of the mill, and are loaded directly into cars through chutes from these bins.

It is estimated that 20,000 pounds of ½-inch steel laundry lining is used in the mill. All screen jackets have false linings of ½-inch flange steel. All hoppers, spouts and other parts subject to wear are similarly protected. The elevator head and boot are lined with white iron plates 1½ inch thick. All framing throughout the mill is 12x12, 10x12 and 8x10. Ample power and sufficient strength in all transmitting machinery is provided for doubling the capacity of the mill at a later date. All concentrating tables in the mill are provided with expansion pulleys. It is expected that the mill will be in operation by Jan. 1, 1902, with 150 tons daily capacity.

\*See illustration on front page.



Sectional View.

Automatic Drilling Swivel.

foot is less than the cost of manila per foot. Their ½" plow-steel drilling line has a breaking strain of twenty-seven tons. Its wearing quality is asserted to be three times greater than manila. Drilling

THE tunnel for the electric power plant on the Canadian side at Niagara Falls will be 2200 feet long, 19 feet high by 21 feet wide. It will be brick lined throughout. The contract price is said to be over \$500,000, and the work is to be completed by Jan. 1, 1902.

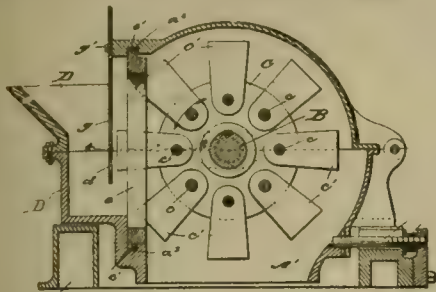


## Mining and Metallurgical Patents.

Patents Issued November 12, 1901.

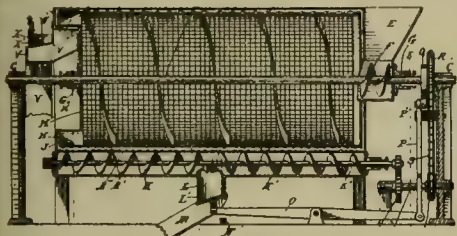
Specially Prepared for the MINING AND SCIENTIFIC PRESS.

CRUSHING MILL.—No. 686,364; T. L. Sturtevant, Quincy, and T. J. Sturtevant, Newton, Mass.



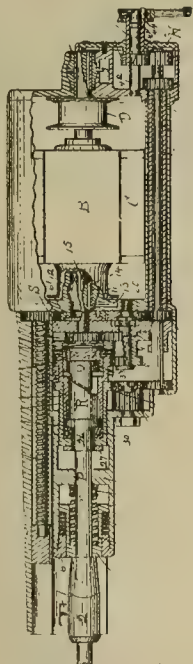
A revolving shaft provided with a beater-carrying head, a case inclosing head, a series of pivoted beaters attached to head, a hopper, a grate interposed between hopper and chamber of case in which hammer or beaters rotate, hopper having an upper feeding chute and a lower receiving pocket communicating with chute in which material to be crushed is held in a substantially fixed mass while being subjected to action of beaters so that material may be reduced in receiving pocket by percussive action, and means for changing relative positions of grate and shaft, whereby revolving beaters may be caused to extend more or less into chamber of hopper through bars of grate.

ORE SEPARATOR.—No. 686,263; J. Conley, Denver, Colo.



A cylindrical screen, having an inwardly projecting spiral rib to move the contents of screen in one direction, a conveyor located in proximity to lower side of screen and moving sand in opposite direction, a casing to contain water and having its walls near the screen and conveyor, whereby agitation of conveyor causes sand to pass back into interior of screen, means for removing ore and sand from bottom of casing, and means for passing sand through screen and casing.

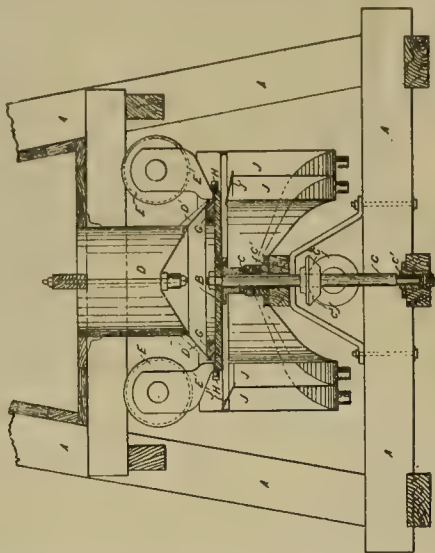
ROCK DRILL.—No. 686,444; H. D. Crippen, New York, N. Y., and G. White and G. S. Maxwell, Jersey City, N. J.



A cylindrical case, a motor enclosed therein, integral extensions on each side having ways for drill elements, a drill shell arranged in each extension and movable longitudinally on ways; a ram, bit, mechanism for effecting percussive rotation thereof, main-spring, ram cam and driving cam arranged in each drill shell, variable connections between motor and driving cam; two cranks suitably journaled on rear of case and adjustable each in two positions, connections between both cranks in one position and driving

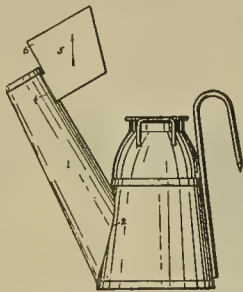
cams to vary distance between cams, and other connections between both cranks and an electric switch mechanism to turn on current when cams are separated; feed screws suitably supported, and connections between feed screws and their respective drill shells to feed drill elements, connections between each crank in its second position and corresponding feed screw to operate screw, and adjustable connections between cranks whereby each shell may be fed independently, by its own crank or both shells fed together by either crank.

MAGNETIC SEPARATOR.—No. 686,402; T. J. Greenway, East Adelaide, South Australia.



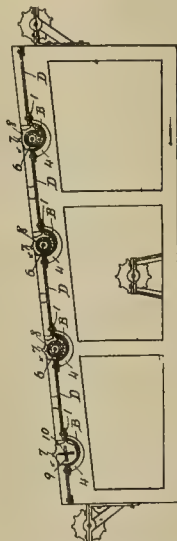
A horizontally revolving plate of magnetic material, electro-magnets so arranged above and below plate that poles of one polarity are opposite those of other polarity and located to magnetize said plate by induction at certain points of its travel, means for feeding material onto portions of plate, and mechanism for driving plate, thereby carrying ore particles along magnetic fields and centrifugally discharging non-magnetic particles from edge of plate at magnetic, and magnetic particles at neutral portions of plate.

MINER'S LAMP.—No. 686,290; M. F. Hammond, Throop, Pa.



A sloping wick tube soldered thereto, a plain flat deflector attachable to tip of tube, and having a corner extending into flame, greater part of deflector being above level of tip of tube.

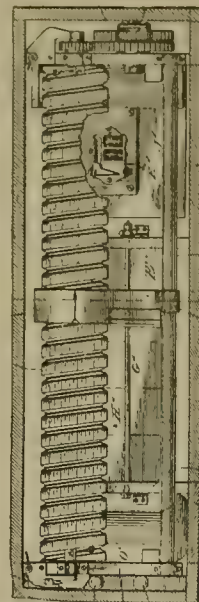
AMALGAMATOR.—No. 686,300; F. J. Hoyt, Chicago, Ill.



An inclined receptacle containing liquid amalgamating material, a plain smooth-surfaced cylinder in receptacle positively revolved in direction of flow of

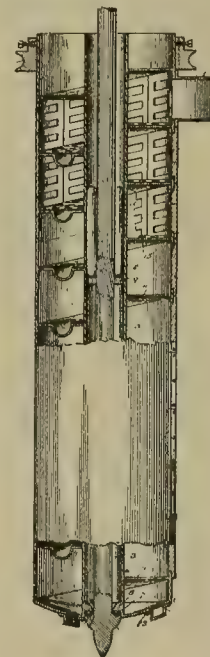
ore and having its axis nearer lower than upper edge of receptacle whereby a greater space will be between upper edge and periphery of receptacle for carrying ore into receptacle and spreading it and carrying it out over lower edge of receptacle onto plate below, without lodging in lower edge.

APPARATUS FOR LOCATING METALS, MINERALS, ORES, ETC.—No. 686,632; A. P. McClatchey, Chicago, Ill.



A Wheatstone bridge provided with earth connections, a source of current supply, source of current supply being connected to bridge, a rotatable screw, a resistance conductor arranged in grooves of screw and forming artificial resistance of bridge, an indicating device arranged in bridging circuit of bridge, a movable contact also arranged in bridging circuit and arranged to make contact with resistance conductor, a nut mounted to travel upon screw and carrying conductor, and means for actuating conductor, Wheatstone bridge provided with earth connections.

SUBAQUEOUS MINING MACHINE.—No. 686,467; S. C. Monberg, Leadville, Colo.



A revolvable casing composed of inner and outer shells, a spiral floor connecting shells from end to end and a concave bottom closing lower end of casing, shovels opening into bottom, pockets disposed at intervals in spiral floor, raffle plates covering floor, a discharge way at upper end of casing, a shaft projected through casing, and which supports casing and on which it revolves, a rack bar on upper end of shaft and means to actuate rack bar to lift shaft with casing.

THE Loschwitz, Germany, suspension cable railway has been opened to traffic and is the first of its kind for the conveyance of passengers. It runs from Loschwitz, a village on the banks of the River Elbe, about 5 miles from Dresden, to the top of the Rochwitz Heights. The railway is 820 feet long, and the grade is 32%. The railways are carried by thirty-three hand piers of varying sizes, the tallest being 49 feet. Each car holds fifty passengers and weighs, when occupied, nearly thirteen tons.



## Electric Welding of Pipe.

Written for the MINING AND SCIENTIFIC PRESS.

The electric system of welding affords a very simple and convenient method of making large pipes in the field where they are to be laid. Sites for field shops can be selected at convenient points along the line on which the pipe is to be laid and the iron or steel sheets are distributed to these shops direct from the plate mills. The shop requires for its machine equipment, bending rolls to bend the plates and bands to the required diameter of cylindrical shell form, a welding machine for the longitudinal seam, a portable oil furnace for heating the bands for the transverse joints, and a welding machine for the bands. The electric power can be brought to the shop by a transmission wire from a generator located at a distant water power, or a portable steam engine or gasoline engine and dynamo can be used. All of the machinery is portable and can be taken down, shipped and set up again in a few hours, or it can be moved forward from day to day as the work advances. The power required is merely nominal.

In the manufacture of this pipe the method is as follows: The sheets are rolled into cylinders of the proper diameters. These are placed in the longitudinal seam welding machine and can be either butt welded or with very light metal lap welded. No flux is used nor manipulation other than mechanically clamping the two edges firmly in place and alignment, applying the electric arc in a furnace, which confines the heat to the line of application, and, when the metal is at a welding heat, squeezing or rolling the seam. The ends of the pipe sections are joined together by means of hoops or bands about 3 inches wide. These are heated in the oil furnaces and then shrunk on, being subsequently welded. It is practicable to omit the band and butt weld the sections together in the excavated trench, thus making the pipe a continuous tube, seamless and jointless except for the weld lines, which do not show in the completed work.

The welding heat furnished by the electric arc is preferable to the blacksmith forge heat. There is no opportunity for coke, ash, sulphur or phosphorus to come in contact with the metal when the latter is raised to the welding temperature. The process is purely mechanical, as the electricity has nothing to do with the welding itself. It merely furnishes the heat.

Mortimer E. Cooley, Professor of Mechanics at the University of Michigan at Ann Harbor, made the following series of tests to determine the relative strength of the electric welded joint as compared with the unwelded metal:

A 30-inch cylinder was made of No. 16 gauge steel,

.066 inch thick, the seam being welded by the electric arc. This was cut into ten rings or bands, each 2.5 inches wide. Each of these rings was divided into semicircular halves, one with the weld in the center, the other half of the ring being entirely unwelded metal. The record of the tests was as follows, the two halves of each ring being tested under the same number in order to make a direct comparison:

|        | Unwelded.                     | Welded.    | Remarks.                                         |
|--------|-------------------------------|------------|--------------------------------------------------|
| No. 1  | broke at strain of 7,610 lbs. | 7,325 lbs. | Broke in the weld and along side of its edge.    |
| No. 2  | " " " " 8,800 "               | 6,950 "    | Broke in the weld.                               |
| No. 3  | " " " " 9,200 "               | 7,620 "    | Broke in the solid metal 5 inches from the weld. |
| No. 4  | " " " " 8,763 "               | 8,765 "    | Broke in the solid metal 4 inches from the weld. |
| No. 5  | " " " " 8,665 "               | 8,300 "    | Broke in the weld.                               |
| No. 6  | " " " " 8,635 "               | 8,580 "    | Broke outside of the weld.                       |
| No. 7  | " " " " 7,520 "               | 8,060 "    | Broke 2½ inches outside of weld.                 |
| No. 8  | " " " " 8,260 "               | 8,300 "    | Broke outside of the weld.                       |
| No. 9  | " " " " 8,000 "               | 8,450 "    | Broke at 4½ inches from the weld.                |
| No. 10 | " " " " 7,910 "               | 8,270 "    | Broke at 7 inches from the weld.                 |

The metal was not selected, a sheet of the ordinary commercial delivery being taken. The differences between the halves, where the breaks were outside of the welds, were doubtless due to slight differences in cross section of the metal. Only three of the breaks were in the weld. In the other seven the welded seam was as strong as the unwelded metal. The break in the No. 2 weld was the poorest, but showed 80% of the strength of the unwelded solid

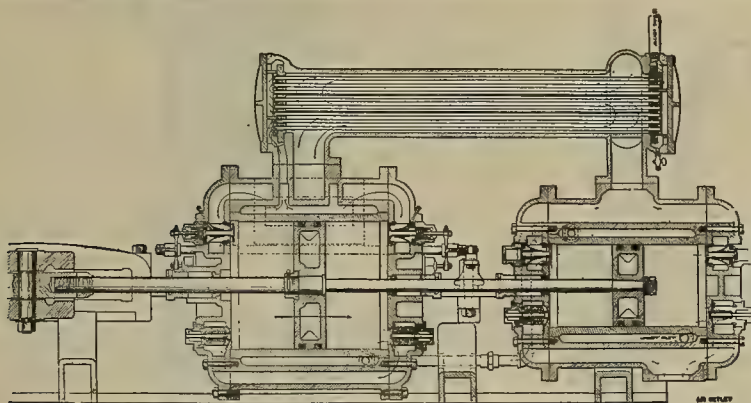
metal. The average of all ten welded seams showed 95.6% of the strength of the unwelded metal.

The greatest advantage of this method of electric welding of water pipes is in the saving of metal possible by reason of the greater tensile strength of the welded seam, as contrasted with the strength of the double riveted seam. The latter has at the best not more than 70% of the strength of the solid metal, as compared with 95% strength of the welded seam. This makes possible the saving of not less than 25% of the weight of sheet metal required.

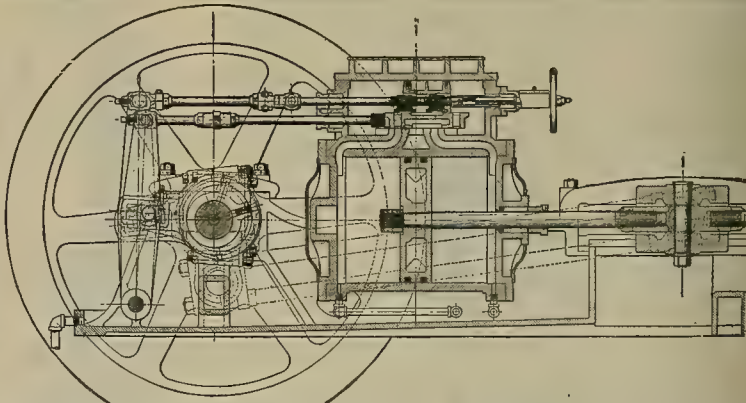
### American Methods Leading.

Dr. A. Wiegand, a German mining chemist, who is making a tour of the world, inspecting the mining properties of various countries, has given his views regarding American miners and their methods.

"The American mines and miners are ahead of everything," he says. "I have found that an American miner was capable of doing twice as much as a Mexican miner, three times as much as a Japanese or Chinese. I must confess that I was really startled at the amount of work done in an American mine. Our country, I might say, is working in the tail-end, where Americans left off long ago. The Americans are practical, in my opinion, just a little bit too practical. While they are the foremost miners in the world, I believe they should inject just a little more mining knowledge into their work. The superintendents of your mines are all young men, just an opposite condition with my country. All of it has been of great interest to me, especially the American mining machinery, the finest to be found anywhere. By saying that my country is working in the tail-end, I mean that the German Government is working mines paying only 2% of capital. This the Government does to give employment to miners, whose ancestors, probably a thousand years before, were miners. In Mexico I was astonished to see the finest mines in the hands of Americans and Englishmen. You can not find a good mine in the hands of Mexicans. It is ridiculous how cheap a mine can be bought there. I met a number of Mexicans, owners of splendid mining properties, willing to sell a portion of the land for \$5000 or \$10,000, gold, or either would accept a stated sum and go into partnership with Americans or Englishmen. The Mexicans seem to lack energy and also do not apparently want to develop the properties. If the present influx continues into that Republic, all good mining properties will be in the hands of foreigners within two years. In China and Japan I also met with surprises, especially in the latter country. There I found the latest American mining machinery and the mines being conducted by Americans, Englishmen or Germans. The Japanese are a thrifty and hard-working people, but have not mastered mining like Americans."



A New Air Compressor.



The accompanying illustration of a new air compressor manufactured by the Sullivan Machinery Co. shows a design containing many novel features tending toward a more simple combination of the best devices used in machines of this class.

No one portion of a compressor has given so much trouble to both users and designers, as the inlet valves and the mechanism controlling them. A wide variety is shown in the designs of various makers. The simplest have usually been uneconomical, and those that are more economical have often been unreliable. On the proper action of these inlet valves depends to a large extent the efficiency of the whole machine. The two best known types used are the automatic spring poppet valve and the mechanically moved Corliss valve. The chief objection to the first is that a vacuum is induced by the resistance of the springs used; the second is often difficult to maintain in proper adjustment, as to time of opening and closing, and tends to get leaky by reason of the severe strain it encounters. This type of valve usually requires a complicated moving mechanism.

In this new Sullivan compressor a combination of the economy of the Corliss type of inlet valve is made with the practical simplicity of the poppet valve. In this machine the inlet valves of the low-pressure cylinder are of the poppet type, with the valve stem

connecting through springs to plungers which are attached to yokes at each end of the cylinder. These yokes are operated through a motion rod by a cam attached to the crank pin. The motion given opens and closes the valve quickly and keeps them in a state of rest, both open and closed during the proper time. This cam device, while new in air compressor practice, has been used many years in steam engines and has proven itself to be accurate, durable and nicely adjusted to this service.

The machine is essentially a straight-line, two-stage compressor, but the usual design has been departed from in several particulars. The high-pressure air cylinder is placed on the extreme end of the frame, and as its discharge pipe is beyond the end of the foundation the cutting away of the masonry is avoided, and at the same time the joints are easily accessible. The low-pressure air cylinder is midway in the frame, which is the most convenient position for attaching the motion rod for the inlet valve. By this arrangement of the air cylinders, the large piston rod passes through the larger cylinder heads and the small rod in the smaller head, avoiding a large stuffing box in the small cylinder-head and giving more available space for valve area. As the piston rod does not pass through the high-pressure cylinder, one stuffing-box only is needed, and one small stuffing-box is exposed to high pressure instead of two larger ones.

The flywheels and shaft are on the other extreme end of the frame, thus the eccentrics, cranks, connections and other moving parts that require most attention are in the most accessible place, either for inspection while running or removal for repairs.

The frame is designed so that all drips of oil or condensation are kept from the foundation and carried to a convenient trap. All cylinders are made with forced liners. Openings are provided for washing out the jackets. The inter-cooler has large cooling surfaces. Copper tubes are used, which are made safe from leakage by a simple and durable device. A feature of this inter-cooler is that both air and water are baffled and traverse its length three times.

The steam engine valve gear is of the Meyer adjustable cut-off type, but the valve is provided with the Richardson balance. The swivel pattern cross-head is used and swivel pin is held in a device which provides for the take up of wear. The governor used is a combination of the centrifugal ball and pressure types, giving a sensitive adjustment to the varying consumption of air, and also providing against disastrous runaways.

The makers of this machine say they have aimed to produce a compressor of the highest possible grade, combining the best known reliable devices to obtain a simple, durable and efficient machine.



# MINING SUMMARY.

Specially compiled and reported for the  
MINING AND SCIENTIFIC PRESS.

## ALASKA.

### CIRCLE CITY.

F. J. Dinan says of the Birch creek placer district, 75 miles back of Circle City, which he visited lately, that the place has a future under improved methods of mining. Several hundred men were engaged working on the various streams tributary to Birch creek this summer, and every operator engaged made something after having paid \$1.20 an hour for labor. The gold is worth more than \$19 an ounce. Thirty ounces to the box length was taken from Sutter's claim on No. 6 above on Eagle creek every eight days with five men shoveling in during the day and five at night. Sutter made a clean profit this summer of \$6000. Others did almost as well. From Circle City to Eagle creek, 75 miles, the charge for freighting is 30 cents a pound, and to Miller, 65 miles, it is 25 cents. In all probability a road will be built into Birch creek district soon, perhaps next year.

### COOK'S INLET.

The Turnagain Arm G. M. Co., incorporated under Arizona laws, is owned principally in Minneapolis, Minn., and in Milwaukee. J. L. Michaels of Minneapolis is president, and L. S. Ovitt of Waukesha, Wis., is secretary. The company has made the first "cleanup" of gold from its claims on Gulch creek in Turnagain Arm. The amount, all in nuggets and coarse grain gold dust, weighs about fifty pounds. It is proposed to work the claims by hydraulicking and a plant has been installed.

### JUNEAU.

In Gold creek, at Juneau, the Ebner G. M. Co. will install twenty-five additional stamps in the spring. The London Exploration Co. will commence the long tunnel which they propose to drive from the head of the Last Chance mine to open up their property, upon which they have been making milling tests the last two years. This tunnel will be 6300 feet long, costing not less than \$150,000, including upraise.

C. Pierce, general superintendent of the Alaska Perseverance mine, is now building boarding houses and preparing to house a large force of men to drive a 2400-foot tunnel still farther up the creek to open their mines.

### KETCHIKAN.

At the Gold Mountain group, Helm bay, under bond to a New York company, the camp, consisting of assay office, bunk house and cook house, has been established, a crosscut tunnel is being driven 130 feet to cut the vein at about 80 feet from the surface. The crosscut is now in about 60 feet. Other development work is under consideration.

At the Copper Mountain mine at Coppermount, Prince of Wales island, the developments at present consist of a tunnel in about 300 feet at a depth of 75 feet below the outcrop, and all the way in very high grade carbonate ore, together with a winze, about midway between the two ends, sunk to a depth of 75 feet, also all the way in ore of the same grade. The last shipment made to the smelter was settled for on the basis of 29½% copper. The mine is now in condition to make shipments up to the full capacity of the aerial tramway which delivers the ores to the bins on the wharf. The company has made six shipments to the smelter since July, in all 1125 tons, and the net returns from the smelter have been from \$50 to \$60 per ton. The carbonate ore is gradually being replaced by black oxide of fully as high grade and about as easily mined as the green carbonates.

## ARIZONA.

### COCHISE COUNTY.

Supt. Dwight of the Bisbee West M. Co., near Bisbee, says that recently, upon reaching a depth of 725 feet in the main shaft, so much water was encountered that the company contemplates the installation of a large pump to be operated by compressed air.

Over in the Dos Cabezas mountains, in the eastern portion of the county, the Pearl G. M. Co. is running a tunnel now in 180 feet on ore all the way. In the tunnel the company is sinking a winze on a rich streak of ore. The shipping ore will run in the neighborhood of eighty ounces to the ton.

At the Buckeye M. Co. camp, near Bowie, a tramway from the mine to the mill site is being built and grading is under way for the 50-ton concentrating plant.

### GILA COUNTY.

Denver men have bought six claims from Goodwin, DeCloss & Hechtman, located near Globe. There are several large

veins on the surface, all of which show values in gold, silver, lead and copper. A shaft 20 feet deep shows a vein of copper ore 2 feet wide, which averages 15% copper, besides other values. The buyers are R. M. Force, F. A. Wright, C. V. Mead, J. D. Whitman and C. W. Merritt, and they have organized the Arizona-Colorado Copper Belt & G. M. & M. Co; capital, \$2,500,000; office at Globe and a branch office at Denver.

### GRAHAM COUNTY.

R. Fleming, who is interested in the strike in the Galluro mountains, says the face of the ore body, where it is crosscut by the canyon, is 600 feet wide, and the ledge can be traced along the hill either way from the canyon for thousands of feet. Mr. Fleming says that samples from all over it show good values. A company has been organized for the purpose of developing the mine and building reduction works. Twelve miles from the mine there is good natural water power, and it is proposed to generate electricity for reduction purposes and transmit by wire to the plant, which will be near the mine.

### MARICOPA COUNTY.

The Socorro G. Co., Mr. Witherlay manager, have commenced their 30-stamp mill construction in the Harqua Halas, 65 miles southwest of Wickenburg.

### SANTA CRUZ COUNTY.

M. Lully of the Santa Rita M. Co.'s mines, near Nogales, says that the company had forty men working. The shaft is down 240 feet and work will be continued on it to a depth of 500 feet.

### YAVAPAI COUNTY.

Oil is to be substituted for coal at the United Verde mine, Jerome, and at the Old Dominion mine, Globe. Tests have been made, and oil has proven entirely satisfactory at both plants. The coal now used at the United Verde comes from Senator Clark's mines at Gallup, N. M., the United Verde Co. paying \$90,000 per month for freight charges alone on coal and coke. Experiments are in progress in many other copper plants, including the Shannon and Detroit Copper Co. at Clifton, and it is likely that oil will become generally used in the operation of hundreds of plants, where the high freight rates put coal prices so high that operation is now unprofitable. The oil to be used will come from southern California and Texas.

## CALIFORNIA.

### AMADOR COUNTY.

The Amador & El Dorado M. & M. Co., owner of the Upton mine, near Plymouth, has completed a boarding house. Work was commenced recently erecting buildings for a 10-stamp water power mill. The buildings will be completed by Dec. 15. J. F. Taylor, secretary and manager, is superintending the work. A tunnel has been driven 300 feet along the ledge, 100 feet below the surface, showing a continuous ledge 2 feet thick between granite and porphyry. The ore assays about \$10 a ton.

The mill at the Amador-Phoenix mine, at Irishtown, is expected to begin crushing by the first of December. The shaft is now down 110 feet and will be sunk 30 feet deeper. A station is being cut at the 100-foot level and a crosscut will be made to the ledge. S. G. Spagnoli of San Andreas is one of the principal stockholders.

A good ledge is reported struck in the Slaughterhouse mine, at Oleta. The rock assays \$50 per ton and the ledge is 3½ feet wide. W. Rutledge is Supt.

### BUTTE COUNTY.

J. T. Sparks, formerly of Lovelock, has made surveys of a tract of drift placer land in the neighborhood of Chaparral House, on the Oroville & Susanville road. He has organized the Red Gravel Channel M. Co. to open this ground.

### CALAVERAS COUNTY.

Sinking is going on in the Sheep Ranch mine, at Sheep Ranch, and it has been decided to run the shaft 150 feet farther before opening any more levels.

The Calaveras mine, near Sheep Ranch, is being developed. The machinery belonging to the old Pioche mine has been removed to the Calaveras mine.

At the Mead mine, at Rich Gulch, work is being pushed by Supt. J. Thors. To handle the large flow of water a steam power pump and hoisting rig has been put in.

At the Fanny Marie mine, at Glencoe, owned by Boston people, eight buildings have been erected and water pipes have been put in. The old winze was sunk 40 feet deeper and a 2-foot lead of high-grade ore has been exposed. It is the intention of the owners to soon erect a stamp mill at the mine.

The Calaveras Water, Power & Mining Co. are putting the Round Butte gravel mine, near San Andreas, in shape for winter working. The three restraining

dams on Baptiste creek have been completed and accepted by the Government. The upper ditch taking the water from San Antonio to O'Neill's is completed. The dynamo for the electric plant is ready to be put in place.

The Johnson mine, near Glencoe, is at present being developed by Cripple Creek, Colo., people. A strike of ore has been made in it which it is claimed will run \$150 to the ton.

J. Thors, Supt. of the Mead mine at Rich Gulch, says much water has been encountered, which has necessitated the putting in of steam power for hoisting and pumping.

At the Fanny Marie mine, at Glencoe, the bottom of the old shaft has been reached and drifting has commenced. An old winze 40 feet deep was sunk an additional 40 feet, at which point a 2-foot ledge of good ore was struck. The rock shows free gold and is high grade. The company has erected eight new buildings, and as soon as the main ore body is struck a mill will be erected.

Cripple Creek, Colo., people are engaged in developing the old Johnson mine, near Glencoe. They have struck four parallel leads. The ore will average \$25 a ton.

### EL DORADO COUNTY.

The Lone Star drift mine, at Smith's Flat, near Placerville, is being reopened by H. Reeve, representing a San Francisco company, who has let a contract to Hughes & Gregory Bros. to take out and mill 2000 cars of gravel.

It is reported that operations will shortly be begun on the South Sligo mine at Spanish Dry Diggings. C. W. Keeny is superintendent.

### HUMBOLDT COUNTY.

(Special Correspondence).—The Orleans Bar G. M. Co., a New York corporation, is operating on Graham's Flat, near Orleans Bar. The water supply is at present short, but two giants (a No. 5 and No. 4), under pressure of 300 feet, are cleaning bedrock and washing gravel. The bank is 50 feet high, with a light gravel easily worked. The water is brought from Camp creek in a ditch and flume some 12 miles long. Seven miles of it are flume. There are two sawmills on the property and there is a telephone to the head of the ditch.

Considerable prospecting is being done in the Red Cap creek district for copper. Some very fine rock and a little native copper has been discovered, but no true ledge has yet been found.

There are several small but good mines in the vicinity of Orleans—the Pearce, Salstrom, Wilder and Markusen mines—but the inaccessibility of the country is very much against successful development. It is reached either from Yreka, via Etna to Sawyer's Bar by stage, and thence by trail via Bennett at the forks of Salmon river, or another from Eureka, by Arcata and Hoopa valley. The nearest wagon road is 30 miles away and all supplies have to be packed in on mules.

Orleans, Nov. 15.

### NEVADA COUNTY.

Under Supt. Miller, the Stiles mine, at Nevada City, is showing well. The north drift from the bottom of the incline is in 175 feet and the 10-stamp mill is running steadily.

At the Mountaineer mine, near Nevada City, Supt. Dennis is investigating new machinery for working the ore. It is said a dry process will be installed. Roll crushers will reduce the rock instead of the stamp mill, and from the crushers the pulverized ore will go to dry concentrators to separate the tellurides which ordinarily float from the plates in a mill.

Supt. Gassaway is rushing work at the De Noon gravel mine, near North Bloomfield. Some 2000 feet above the mouth of the tunnel a shaft has been sunk which is now down to the level of the tunnel, and as soon as the compressor is in operation work will begin both ways from the bottom of the shaft. The tunnel is now in over 200 feet. It is estimated that the tunnel will have to be run about 5000 feet to enter the channel. The work from the time of the start, it is expected, will take about fifteen months.

The Hunkin quartz mine at Omega, C. W. Porterfield owner, it is reported, will be opened by a San Francisco company next spring.

The new gravel crushing mill at the Grizzly Hill mine, above Nevada City, is now in operation and is estimated to be handling about 240 tons of cemented gravel daily. J. F. Dudley is foreman of the mine and there are about fifteen men employed.

G. W. Hay, Supt. of the Ironclad mine, below Rough and Ready, says the hoisting and pumping machinery is now in place and the pumps have started to lower the water in the 180-foot shaft.

J. P. Wood, who has the bond on the Sharp mine at Canada Hill, near Nevada City, intends to resume operations on it

in the spring, when it is expected that machinery will be erected.

### PLACER COUNTY.

The Shady Run M. Co. has its stamp mill, buildings and road completed. The stamps will be put in as fast as there ore to crush, and when completed there will be forty.

Two carloads of ore from the Lost Emigrant mine, located about 16 miles southwest of Summit, returned \$3500. The ore on one car assayed \$135 and the other \$178 per ton. F. L. Heath of Colfax is one of the owners.

### PLUMAS COUNTY.

The Adelaide M. & M. Co. has been incorporated, with office in Reno and its works in Plumas county. R. C. Taylor is general manager and J. Sunderland, Jr., secretary. The company has started work to continue through the winter.

### SANTA CLARA COUNTY.

Gold and silver ore in paying quantities is reported to have been found near New Almaden in a mine owned by W. H. Adams of San Jose. The ledge will assay from \$4 to \$6.50 in gold and from \$3 to \$6 in silver per ton. The mine is supposed to be rich in quicksilver, for which it was being developed. A hanging wall to a ledge had been encountered, and the workmen were at a loss to know what it was. On expert examination it proved to be iron oxide and pyrite carrying gold and silver.

### SHASTA COUNTY.

The Colorado claim, near Shasta, owned by W. Henry and J. Dawe, has a tunnel in 160 feet, which shows a ledge of from 6 inches to 6 feet wide, between well-defined walls. Where the ledge narrows the ore shows rich values and is good milling ore from wall to wall in wide places. Besides the 160-foot tunnel there is a shaft 60 feet deep on the mine.

A discovery of platinum is reported in the Postam Bros.' mine in Harrison gulch. It is said that many prospectors are out looking for the metal and numerous locations have been made. In early days considerable platinum was found in Brown's creek in this county and on the Trinity side of the mountain from Harrison gulch. It is thought that the platinum found along Brown's creek, and for several miles below where it empties into the Trinity, noticeably at the Chapman & Fisher mine, is a wash from a high deposit in the mountain near the summit of which the creek has its source.

### SISKIYOU COUNTY.

T. Y. Reed and O. H. Lawson of Yreka have taken up a quartz ledge on a supposed extension of the Yreka Flats claim. They intend opening it up.

The O. & C. quartz mill on Klamath river, above Ash creek, is nearly completed, and will be ready for operation in about two weeks. The mill is 10-stamp and the batteries will have two concentrators.

Rich ore has been struck in the Lanky Bob mine on White's Gulch, near Sawyer's Bar, by J. G. Skillen, who has a lease on the claim, from H. Finley. The vein is from 10 to 12 inches in width. He has started an arrastra on a 50-ton crushing. The ore is said to prospect \$100 a ton.

### TUOLUMNE COUNTY.

The Stockton Smelting Co. has decided to locate its smelter in Sonora rather than in Stent or Jamestown. The company has concluded the lease of the Mason reduction works in Sonora.

The Campo Seco G. M. Co., with office at San Francisco, has been incorporated by H. A. Crane, S. Salomon, S. A. Federici, A. Ortion and F. P. Canac, all of San Francisco, with capital \$500,000, to operate in Tuolumne county.

The Yankee Hill M. Co. has been incorporated, with office at Santa Ana, Cal., by A. J. Padgham, A. R. Lowley, J. E. Luther, L. Padgham of Santa Ana and F. H. Roberts of Escondido, capital \$125,000, to operate in Tuolumne county.

The Verona M. Co. has been incorporated in Arizona, with office at Phoenix, Arizona, and a branch office in San Francisco, by J. P. E. Heintz, H. C. McPike and R. D. Duke, capital \$500,000, to mine in Tuolumne county.

W. H. McClintock has bonded the Haskell ranch of 724 acres, near Jamestown, and will develop it for mining.

The necessary buildings are being completed and machinery erected on the Doyle mine at Horseshoe Bend.

J. L. Halk has discovered a vein of ore on his ranch near Sonora. A shaft 60 feet in depth has been sunk on the vein, the rock assaying \$25 to the ton. A 6 H. P. gasoline engine has been installed to furnish power for a hoist.

B. Soulsby of Soulsbyville has bonded to M. Innes of San Francisco the Donella, Champion and Pleasant Hill quartz mines, near Arrastraville, for \$1500 down and balance of \$15,000 within eighteen months.

W. Westlake and associates of San



Francisco have bonded the Seminole mine, near Carters, and will commence operations on a large scale. A new boiler and hoist have been installed and the work of unwatering the mine commenced. The shaft is 318 feet deep. The mill is being put in readiness for crushing as soon as the mine is free from water.

Operations at the Prudhomme mine, near Carters, have been resumed after a suspension of several weeks, caused by failure of the water supply. It is the intention to put up a hoist that will enable sinking to a depth of 800 feet, and run it by steam power, instead of water power as at present, using the latter only for the mill.

A. H. Hiatt and V. Haynes have bonded to G. Lightfoot the Victoria No. 1 and Victoria No. 2 quartz mines, near Sonora, also a 2-stamp quartz mill, at \$20,000, until Nov. 1, 1902. Mr. Lightfoot is to begin operations on the mine before May 30, 1902, and keep at least four men continually employed.

J. E. Summers and J. Gloster have bonded to A. White of Vallejo a half interest in the Hardtack mine, near Sonora, for \$10,000, until Nov. 9, 1902. The mine is to be developed by Mr. White.

#### COLORADO.

##### CHAFFEE COUNTY.

Under the assurance that the Aspen-Buena Vista railroad will be built, the mining situation in and around Buena Vista is improving. Within the past few months many heretofore abandoned mines have been leased and operations resumed. A company has been organized, capital \$125,000, to build a copper matte smelter at Buena Vista early next spring. The principal stockholders in the smelting company are already interested in the different mining companies organized by Mr. Bowman of Buena Vista.

The Hamilton M. & T. Co. are in 312 feet on their Kosman crosscut tunnel, nearing the Doctor Pass vein. This company have good pay ore in their Crown Point and Allentown, which they will get at through the Kosman tunnel at a depth of nearly 1000 feet.

##### DOLORES COUNTY.

The Rico M. & M. Co. has just shipped a full trainload of zinc concentrates to the Vieille Montagne Zinc Co. at Antwerp, Belgium. The mill has now been running since February, being increased in capacity till it now treats sixty tons of ore daily. The product is divided into three classes, zinc, lead and iron. The zinc concentrates now run up to 55% to 60%, and carry less than 4% iron. The lead concentrates go above 60% and carry less than 3% zinc. The iron is practically free from both lead and zinc and is a desirable flux for a local smelter. D. H. Campbell has succeeded L. D. Mather as local manager, C. D. Hooper has succeeded E. B. Green as head millman, and T. Thompson is in charge of the mines.

The machinery for the Mt. Goram M. & M. Co.'s new 10-stamp mill for the Smuggler mine at Rico is being set up, and it is expected to start the mill by December 1st. The mill is steam heated and lighted by electricity. The capacity is estimated at thirty-five tons daily. A wire rope tram, 700 feet in length, is used to take ore from mine to mill.

##### GUNNISON COUNTY.

J. K. Hallowell of Chicago has bought the Forest Queen mine, in the Irwin district, near Gunnison, from the Forest Queen M. Co., which had F. W. Fuller as manager. The property is bought for Milwaukee people. The mine was located and developed into an extensive shipper in the early days. It has been practically idle since 1893.

The Belgora-Bassick M. & D. Co., operating a group of thirteen claims near Pitkin, says work will be pushed throughout the winter. The company is now under the management of W. S. Henderson, secretary and treasurer.

##### OURAY COUNTY.

The Teller Mines Co., near Ouray, has commenced active operations for the winter. The Teller has been worked intermittently by leasers during the past three years, but new owners have the mine now and will develop it and other adjoining claims. The tunnel is in 575 feet. A. Arps of Ouray is president of the new company, and L. G. Brewer secretary. L. P. Pliskaer is Supt.

The Colorado Gold-Copper M. & T. Co. has resumed operations and will immediately erect a generating station and power plant to put air drills at work before the year closes. F. Carney and F. J. Hulaniski of Ouray are directors of the company.

##### SAN MIGUEL COUNTY.

The buildings at the mouth of the Bullion tunnel, through which the Smuggler-Union mine at Telluride is worked, were destroyed by fire on the 20th and the mine

filled with deadly gas and smoke. It is feared the loss of life will reach nearly, if not quite, thirty. The fire started about 7 o'clock in the morning from a defective flue in the bunk house and quickly communicated with the other buildings. The dense smoke from the burning transformer house, which was saturated with oil, went into the tunnel, the shafts of the mine acting as chimneys to create the indraft. The day shift were on duty and before they could be warned the levels and stopes were filled with smoke and gas. They made efforts to reach the surface through old upper workings, and about half of those in the mine escaped. Twenty-two bodies have already been recovered from the No. 7 level, and seventy-five men were known to be at work on the ninth level, which had not been reached when this was written. A rescuing party cut a connection through from the Commission workings adjoining and took out part of the men who escaped. The draft into the mine of the smoke, which continued after the buildings were burned down, was finally shut off by blasting rock into the tunnel. The Smuggler-Union M. Co., which owns the mine and tunnel, is composed of New York and Boston people. A. L. Collins and B. B. Lawrence are the managers, both of whom, it appears, were absent from the mine at the time.

##### SUMMIT COUNTY.

The recent copper discoveries made in the range on the east bank of Blue river, 41 miles north of Breckenridge and 12½ miles south of Kremling, is reported indicate that a good camp will be started there.

##### TELLER COUNTY.

(Special Correspondence).—The Mary McKinney is shipping sixty tons of ore per day, which runs \$40 to \$50 per ton, most of which goes to the smelter. This production comes from all the different levels. Supt. Keener states that a large amount of development is being done. The drifting on the fifth level equals 2400 feet.

Anaconda, Nov. 9.

(Special Correspondence).—The El Paso mine, on Beacon hill, has become one of the important producers of the district, and it is given out that it will soon be a dividend payer. The holdings of this property amount to sixty-one acres and are owned by two or three shafts. The main vein extends nearly northerly and southerly. The principal working shaft is 600 feet deep with drifts and levels from it aggregating 1200 feet. On the 600-foot level an ore shoot is opened 300 feet in length and has a width of ore 2 to 16 feet. The shipments now are said to be worth about \$2000 per day, much of the ore averaging \$150 per ton.

Supt. W. M. Bainbridge has installed an interesting ore-washing device. The ores come from the mine in a damp condition, with considerable amount of loose, decomposed material adhering to it. After being screened this ore passes through chutes to the sorting bins, but on the way is subjected to jets of warm water from the boilers, washing off the pulverized particles into a V-shaped spout, the latter emptying into a settling tank. The settled slimes and pulp thus caught amount to 1200 pounds per day. After the water is poured off, the pulp is dried by exhaust steam pipes and is found to run \$150 per ton, consisting of particles of sylvanite from the ore seams. This rich ore from the sixth level of the El Paso is in the granite, below the phonolite.

Supt. Bainbridge states that about Jan. 1, 1902, he will begin sinking a new three-compartment shaft. It will be 5x14 feet in the clear, the main cageway to be 5x6 feet. Instead of having a double-deck cage, he will provide for a double-track cage, so that two cars may ride side by side. A second cageway for men will be 3½x5 feet. The third compartment will be 4x5 feet for pipes, pumps and ladder. S. S. Bernard, Colorado Springs, is one of the principal stockholders of the El Paso Co.

Cripple Creek, Nov. 9.

(Special Correspondence).—The Elkton, of which Sol Camp is Supt., is shipping about 2000 tons of ore per month, running about \$60 per ton. The shaft is 80 feet deep, from which 1600 gallons of water per minute are pumped. The present tonnage of ore comes from the 600 and 700-foot levels. George Bernard, president of the Elkton Co., states that the average gross value of the ore produced for the year ending May 31, 1901, was \$60.33 per ton, the output for that period amounting to 19,080 tons. The underground development for same period aggregated 4812 linear feet, the stoping amounting to 14,800 square yards. In drifting southward on the 700-foot level a new 5-foot vein of \$50 ore was opened. The mechanical equipment and buildings are among the best in the district. Their hoister is 20x48 inches, duplex Corliss,

with an estimated speed of 2000 feet per minute. The compressor, of Ingersoll-Sargent type, has high and low pressure steam cylinders, air cylinders, all having 48-inch stroke. It has a capacity of 3120 cubic feet of free air per minute. The Prescott condenser attached is 10x16x18. The power is furnished by three Cahall horizontal water tube boilers. The ore house has capacity of 200 tons, with storage bins of 1000 tons capacity. Elkton dividends for the year amounted to \$300,000.

Elkton, Nov. 9.

The Steelsmith lease on the Findley, it is said, will not be extended. The owning company will take hold of the property in its own behalf and continue active operations. Machinery, including a 10-drill compressor, will be installed and extensive development will be started. The new hoist will be of sufficient capacity to lift from a depth of 2000 feet.

The Pinnacle Co. has bonded its fractions, the White Elephant, Dollie R. and Overlooked claims, containing about three and a half acres of ground and which carries about 400 feet of the ore shoot that was recently opened by Terrill and Burke on the Colorado Boss of the Cripple Creek Con. Co. The bond calls for a payment of \$45,000 and runs for a period of two years.

Sioux City, Iowa, people composing the O. K. M. & M. Co., are erecting a 25-ton cyanide mill on Four-Mile creek, 5 miles west of Cripple Creek, to treat the ores of their mines in the Bare Hills district.

##### IDAHO.

##### ADA COUNTY.

D. H. Moseley, Supt. of the Delhi mine, near Boise, says that the mill will be completed by December.

##### IDAHO COUNTY.

E. A. Meade, who has been in the Thunder mountain district investigating for the Oregon Short Line Railway, says the district is exceedingly rich. He followed the main ore body underground for 200 feet in one direction and for 245 feet in a general way at right angles to the other. Running through the main body is a vein 4 feet thick of free milling ore which will run high in value. The main body of the ore of Thunder mountain, he thinks, will run as low in value as \$7 a ton.

A 25 H. P. boiler, a complete sawmill outfit and a 10-stamp mill have just been packed to the Thunder Mountain camp on mules, and Supt. Babbitt says that the mill will probably be running by the first of December.

A mining company, formed to develop claims near Dixie, has been organized at Pendleton, Or., with S. H. Riley, W. T. Rigby and J. T. Kirk, all Umatilla county men, as incorporators.

##### OWYHEE COUNTY.

It is reported that J. Sullivan has struck a good vein in place on the Sullivan & Noble property, near Silver City. It is believed to be the source of the placer gold found close by.

##### MISSOURI.

##### JASPER COUNTY.

At Oronogo, near Joplin, the entire plant of the Aurora M. Co., comprising a 100-ton mill, office building and engine house, together with six gravel cars and an immense tailing pile, were swallowed up in a cave-in of the mine underneath. The workmen heard the timbers cracking before the cave-in started and signaled to be drawn up. The last man had reached the surface only a few minutes when the timbers collapsed, the earth yielded and with a crash the whole plant sank into the abyss. Further caving is feared and work in that vicinity has been suspended.

##### MONTANA.

##### FERGUS COUNTY.

A. H. S. Bird of the Johanna G. M. Co. of Salt Lake City, Utah, has arranged to extend the time for the final payment on the \$80,000 bond on the Spotted Horse mine, near Lewiston. The Central Montana Mines Co. made the initial payment last spring.

##### GALLATIN COUNTY.

McCoy & Co., who are interested in the corundum mines on Camp creek, have bought an old shingle mill near Salesville, to use it for the installation of an electrical plant. The power generated at Salesville will be conducted to Camp creek and used to operate the machinery which the McCoy company will soon place on the property.

##### MADISON COUNTY.

A mining company has been incorporated in Utah, capital \$1,000,000, to mine in the Rabbit mining district in Madison county. The incorporators are: A. W. McCune, Jr., J. S. Wells and L. Seckel of Salt Lake City, Utah, and F. E. Sergeant of New York. C. H. Hand of Butte is named as the Montana agent of the company.

##### SILVER BOW COUNTY.

The Butte & Iowa M. Co., which is developing the Colorado claim at Butte, has struck a vein of copper-silver ore that is claimed to assay 7% copper and eighteen ounces in silver. Supt. Hewitt reports that the shaft is down 250 feet. At a depth of 230 feet the shaft cut a lead from 24 to 30 inches wide, composed of quartz, heavy in iron, assaying 18.4 ounces in silver and 6.8% copper.

##### NEVADA.

##### ELKO COUNTY.

At the Dexter mine at Tuscarora ore is being sacked that shows from \$300 to \$600 gold, the ore coming from a streak that was encountered in the main drift connecting Dexter workings with the Tuscarora.

##### HUMBOLDT COUNTY.

The Glasgow & Western Co. at Golconda has made plans for the enlargement of the 100-ton smelting plant, and by December 10 it is expected that the estimates will have been received and approved by the directors of the company in Glasgow, Scotland. As soon as this is done the enlargement of the smelter to 300 tons a day will begin. At the same time the company will start to bore for artesian water.

##### LYON COUNTY.

Salt Lake City mining men have bonded from W. Woolcock and J. Phillips of Winnemucca the Sheba mine and ten other claims near Mill City at \$31,000 in two years, paying \$500 down.

J. Kernan of Mason Valley is developing a mining location, ore from which is claimed to carry a gold value of over \$100 per ton. The mine is located a short distance from Yerington and the vein so far developed has a width of nearly 2 feet.

##### NYE COUNTY.

A carload of Tonopah ore is to be tested at the Rock Point mill and cyanide works near Dayton. A 100-pound sample has been worked which yielded a high percentage of the total assay value, contrary to the belief that Tonopah ore is base and the extraction of its bullion values impracticable by any process but smelting. If the test proves the ore to be practically free milling, or of such a character that it may be cyanided, it is likely that the ore will be worked in the Carson river mills.

Three railroads are planning to build into the Tonopah district, but all are awaiting further development of tonnage before starting. The three roads are the San Pedro, the Nevada Central and the Carson & Colorado, a branch of the Southern Pacific. The route from Soda-ville, on the Carson & Colorado branch of the Southern Pacific, is said to be the simplest and easiest.

##### WASCOE COUNTY.

T. Davidson of Lovelocks has discovered a large deposit of copper 10 miles north of Rye Patch. Assays from an average sample of the ledge where it is 4 feet wide go \$50 per ton.

##### WHITE PINE COUNTY.

The Gold Nugget Co. of Ely, W. B. Lawler manager, has received returns from a test carload shipment of ore, 5.23 ounces of gold and 207 ounces of silver, or about \$225 per ton. A sample of low-grade ore returned between \$50 and \$60 per ton.

##### NEW MEXICO.

##### COLFAX COUNTY.

Work has been resumed on the Horse-shoe tunnel, near Elizabethtown, after having been closed down for three years.

The Belle mine and five adjoining properties, near Lordsburg, owned by Brown-Jernigan & Wood, have been bought by A. E. Gibson of Santa Fe. Systematic work will be commenced at once.

##### SIERRA COUNTY.

The mines of the Silver M. Co. at Lake valley are being reopened. The old workings of the mine will be retimbered and thrown open to leasers and new ground is to be opened by the company. New buildings are to be erected.

J. J. Blow & Co. are working the Marion mine in the Caballos mountains. The tunnel is now in 600 feet, with about a 3-foot lead of copper in the face. Two carloads of ore per month are being shipped, the ore averaging 23% copper. Eight men are employed.

The Las Animas G. & C. M. Co. has resumed work on the Wicks mine, near Hillsboro.

##### OREGON.

##### BAKER COUNTY.

The Copper Ridge G. & C. M. Co., capital \$1,000,000, has been incorporated by E. E. Cleaver, W. G. Drowley and W. W. Reese. The property is the Copper Ridge mine, consisting of four claims in the Quartzburg district. The ledge in the Copper Ridge is 70 feet wide on the surface, and surface assays give an average



of \$32.28 per ton in gold and copper. Mr. Cleaver bought this mine last year for \$15,000, and has worked it continuously since then. The mine will now be developed on a large scale.

The Cornucopia Co.'s mines at Cornucopia have shut down operations for the winter, a few men only being retained to block out ore and keep the mine dry. It is claimed that there is blocked out in the Last Chance claim 30,000 tons of ore which, it is said, will go \$40 to the ton.

The Timber Canyon mines, near Virtue, have been sold by J. Thompson to T. C. Burke. The ledge is claimed to have an average width of 5 to 12 feet through the length of the nine claims in the group. This property has been worked by an arrastra, from which values are said to have been obtained as high as \$40 to the ton. A contract has been let for resuming work on the upper tunnel, which will cut the ledge about 200 feet in depth with about 40 feet of additional work. A 10-stamp mill is projected.

The Flagstaff mine, near Baker City, has been started up, after a shut-down of sixteen months, under the direction of Managers Davis and McLain, who represent the new owners, a New York company, headed by P. H. Campbell. Twenty miners have been put to work and development work started. A compressor and air drill plant is to be installed.

The erection of the new hoisting plant and sinking of the new three-compartment shaft at the Bonanza mine, near Baker City, is under way, and it is expected that before winter the plant will be so far along that it can be completed before spring. The new hoist will cost about \$200,000 when completed. Each of the two 200 H. P. boilers weigh 25,000 pounds. The hoist will have a sinking capacity of 2500 feet. The present depth of the mine is 400 feet. The mine is now employing 150 men, and the monthly output is said to be \$50,000 to \$80,000.

The Belcher mine, in the Greenhorn district, near Baker City, is showing improvement and is high grade, so Supt. W. N. Jackson says.

#### JACKSON COUNTY.

W. H. Maultby and A. Gilson, who have been prospecting at the head of Sterling creek, back of Ashland, have struck an old channel, which promises to be quite rich. A considerable body of gravel, that prospects well, is already in sight.

The machinery at the Exchequer mine, in Applegate district, south of Jacksonville, has been moved to the Rising Star mine by G. St. John, the Supt. of both properties.

#### JOSEPHINE COUNTY.

The opening up in the Silver Creek basin of auriferous gravel, by the running of a tunnel under Silver Creek Falls, is to be undertaken. About 100 feet of tunnel have been run. When opened, the dump for tailings is unequaled and mining grounds of great extent. The portion of the basin to be opened up by the tunnel is owned by Ferren & Thoss, but is under bond to Mettis & Leigh, Colorado men, who have the work in charge.

The Big Yank ledge, in the Galice district, near Grant's Pass, is being developed by the Big Yank M. Co. of Portland. A 100-foot tunnel has been run in, cross-cutting the ledge, and drifts have been run 50 feet each way. The ore is running \$25 to \$30 per ton.

At the lately discovered copper mines on Little Grayback, near Kirby, fifty claims have been taken up. The greater number are being developed. In some of the older claims tunnels have been run to a depth of 50 and 75 feet, or shafts have been put down to this depth. The ledges exposed show widths ranging from 10 to 150 feet, carrying copper values of from 5% to 30%.

#### SOUTH DAKOTA.

#### LAWRENCE COUNTY.

The building for the new sixty-ton cyanide plant in the Yellow creek district, near Deadwood, is completed, and the Alder Creek M. Co. will soon begin treating ore. It has bought the Little Blue Fraction and adjoining lodes, which carry quartzite ore, averaging about \$5 per ton gold.

The Hidden Fortune M. Co. is making arrangements to build its mills at Belle Fourche. H. J. Mayham, general manager, says the company will build a large stamp mill with a cyanide annex to make treatment of the ore practically the same as that used by the Homestake company adjoining. The cost of the railroad haul of the ore to Belle Fourche, 35 miles, is figured by the owners as compensated for by the saving in cost of water.

Deadwood business men and T. H. Smith of Boston, Mass., are considering a proposal of the latter looking to the building of a custom cyanide plant in Deadwood. A committee, consisting of McDowell, Hymer & Bischoff, were appointed to have full charge of further arrangements.

#### PENNINGTON COUNTY.

The Ohio-Black Hills G. M. Co. has been organized to develop 475 acres of mining ground near Rochford. The ground embraced is the Mary Belle mine and the Cyclone property, both having large veins of free-milling and concentrating ore. The Mary Belle mine has two separate veins of ore with a total face of 30 feet, which averages about \$5 per ton gold. On the Cyclone ground there is a vein of ore 55 feet wide at the outcrop, which it is said gives better than \$4 at the surface.

#### UTAH.

#### IRON COUNTY.

The Ophir M. Co. mill at Stateline, equipped at a cost of about \$80,000, has been started up by Supt. Lathrop. The mill has a capacity for treating 150 tons of ore daily.

#### SUMMIT COUNTY.

H. Coleman, S. Hare, W. DeLashmuth, T. Monks, C. Buehler and W. Van Wagner have bought a one-third interest in the St. Louis and Vasa mining claims, near Park City. They have taken a bond at \$25,000 and a two-years lease on the other two-thirds from F. W. Hayt and others. It is the new owners' intention to work the property all winter. Some very rich ore has been obtained from these claims, assays running from 70 to 1400 ounces silver.

#### WASHINGTON.

#### WHITMAN COUNTY.

The Gold Bug M. Co. has elected L. F. Smith of Endicott president, J. W. Cox of Garfield secretary and treasurer, W. J. Tipton manager and A. Burns foreman. The report of Manager Tipton shows the property to be in good condition. A shaft is now down 245 feet and will go to the 300-foot level, when drifting will begin on the ledge from both sides of the shaft. The mine is equipped with a steam drill, steam hoist and full equipment of machinery.

#### STEVENS COUNTY.

The Empire Marble & Onyx Co. has been incorporated at Spokane; capital, \$150,000. The officers are: J. O'Connor, president; J. R. Stone, secretary; J. Gray, Supt. The property consists of eighty acres of marble lands 3 miles west of Adry on the Spokane Falls & Northern Railway.

#### FOREIGN.

#### BRITISH COLUMBIA.

H. L. Harris has bonded a group of iron claims in East Kootenay district at \$120,000. He is said to contemplate the erection of iron furnaces at Frank in Alberta, to use coke from a battery of 250 coke ovens which it is said he will erect there.

B. MacDonald of Rossland and C. Dundee, president of the Dundee M. Co., have been making an inspection of the Dundee mine at Ymir. The mine is to be unwatered.

The London & British Columbia Goldfields Co. has bonded the L. Birtch mine at Ymir and set men to work, the price reported being \$35,000, with 5% down. The vein averages 6 feet in width and visible gold appears freely and evenly disseminated throughout that width.

A stamp mill is to be built on the Wilcox mine at Ymir, the construction to commence next spring. Meanwhile, however, some of the richer ore will be shipped to smelters and development will be continued.

The Department of Mines at Victoria has received many applications for information of the new Horsely Creek gold finds in the Cariboo district, and, in answer, are sending maps and all information of the district in their possession. A rush to the district is looked for in the spring.

Matte shipments from Greenwood are now sent to the Granby smelter at Grand Forks, where a converting plant is being installed. The Greenwood smelter produces from twenty to twenty-five tons of matte per day. This amount will be doubled early in January, when the second furnace is installed.

#### FRENCH GUIANA.

A report comes from Dutch Guiana that on the French side of the Demerara river, well inland, a big placer gold strike has been made. Many men working but a few days, in the most primitive form, it is reported, are taking out large amounts of dust. The letter making the report states that "it is a common daily occurrence to see men with ten, twenty and up into the hundreds of pounds of gold—results of a short period of panning. One man was seen with over eighty-five pounds from less than two months' work by pan. Another man, who has a reservation, is leasing in small blocks for 50% of the gross. He is said to have two kerosene tins (five gallons each) full of coarse and nearly half a one full of fine."

#### KLONDIKE.

A discovery of placers on what is called Quartz creek has caused a stampede from Porcupine, Haines, Juneau and Skagway. Two prospectors left Porcupine during the latter part of August for the interior, going over the Dalton trail. They left the trail at Dalton Post and went toward White river about 40 miles. Quartz creek was prospected by them and found at the surface to run several colors to the pan. Going deeper into the gravel, it yielded from 25 to 40 cents per pan. They felled a cottonwood tree, hollowed it out and, making a sluice box, worked for five days and then made a cleanup that amounted to over \$1000 gold. Fearing that others might drop in on their discovery before they had recorded, they quit work, staked their claims and went back to Pleasant Camp, where they secured their licenses and recorded their claims. Exhibiting the gold at Porcupine and making known the location of their find, a stampede was started at once for the new diggings. The new find is the rediscovery of an old one made in 1898 by prospectors from Shorty creek, on the Dalton trail. The Stick Indians have brought in nuggets from that section for some time. The winter snows will prevent any further prospecting till next spring.

Last year's output of the Klondike is given at \$22,500,000, while it is estimated the clean-up will reach the \$25,000,000 mark this year. The shipment for the four months ending Sept. 30 is as follows: June, \$5,918,000; July, \$9,725,000; August, \$3,000,000; September, \$3,000,000; total, \$21,643,000. The figures are from the records in the Gold Commissioner's office in Dawson, where certificates must be obtained by everyone shipping or taking out gold, under penalty of forfeiture of the dust for non-compliance.

#### MEXICO.

In the Rosalia claim of the Calera G. M. Co. in Sonora a body of high-grade ore has been struck. Manager A. F. Wuensch says his samples from the bottom of the workings show \$178 to the ton in gold. The find in the Rosalia of the Calera Co. gives the group three properties that contain high-grade ore, though the Calera claim six months ago was the only producer. A mill is now being erected on the San Miguel river to treat the output of the group.

The lost Tayapa mines, noted in Spanish records of Mexico as having produced \$80,000,000 in silver and gold in the seventeenth century, which are described on Spanish maps as being situated in northwestern Mexico, about 50 leagues from the sea, near Los Pilares, have been found. Explorers who have recently returned from Cianguita report having discovered the old stone prisons, old smelters, also stupendous work accomplished by the ancients. They say there are many tons of ore exposed, rich in copper, silver, gold, particularly sulphides, that could not be worked by methods then in use.

#### SOUTH AFRICA.

The October gold output of the Witwatersrand shows an increase of 1457 ounces over that of September.

#### Personal.

W. H. THOMAS of New York is at Greenwood, B. C.

DAVID LEMMON is the new foreman of the King Solomon mine, Deeth, Nev.

GEORGE HANCOCK succeeds John Roundy as Supt. Uncle Sam mine, Tintic, Utah.

C. JOHNSON has returned from a visit to Sweden and located at Cripple Creek, Colo., again.

J. ELLSWORTH has been appointed Supt. of the Occidental drift mine at Iowa City, Cal.

G. R. HANCOCK has succeeded J. Roundy as Supt. of the Uncle Sam Con. M. Co. at Tintic, Utah.

JOHN HAYS HAMMOND is now established in New York City, making that place his headquarters instead of London.

JAMES BREEN continues the management of the Dominion Copper Co., at Phoenix, B. C.

JOS. M. NOUGUES, JR., Supt. Josephine mine at Volcanville, El Dorado Co., Cal., was in San Francisco for a few days early in the week.

A. HALL, formerly foreman at the Massachusetts mine at Grass Valley, Cal., has been appointed Supt. of a lead mine at Cartersville, Mo.

BERNARD MACDONALD is managing the Nickel Plate mine, Rossland, B. C. W. H. Bryson has resumed the superintendency of the mine.

J. N. GRIFFITHS, managing director Ivory Coast Gold Fields Co., Ltd., of London, is reported en route to California to

investigate gold dredging methods. It is his stated intention to buy six dredgers for use by his company in French West Africa.

JAS. F. PARKS JR. of San Andreas, Cal., has gone to Korea, to remain there several years, under engagement to a large mining company.

BISBEE, ARIZ., expects that Ben Williams, the old-time Supt. there, will resume his former place at the Copper Queen upon his return from Mexico.

EDWARD BOOTH, instructor in the College of Chemistry at the University of California, has been elected secretary of the Pacific Coast Association of Chemistry Teachers.

R. SCHORR, M. E., consulting engineer for the Trinity Copper Co., Shasta Co., Cal., has resigned his position and on his return from Europe will open an office at Redding, Cal.

THOS. NEILSON, metallurgist and chemist, has resigned the position of mine superintendent for the Trinity Copper Co., and will locate in San Francisco, Cal., where he will open an assay office and chemical laboratory.

W. DURBROW and E. KRUG of Nevada City, are under engagement with a San Francisco mining syndicate to go to mines in South America. Mr. Durbrow will be manager and has appointed Mr. Krug Supt. of one of the mines.

R. H. CAMPBELL, formerly of Shasta county, now of Harper's Camp, Cariboo, B. C., where he is sinking the deepest shaft ever sunk in Cariboo, is in San Francisco to buy mining machinery therefor. He will also put in a complete sawmill outfit and a steamer to ply on Horsely lake.

PROF. NICHOLSON of the School of Mining and Metallurgy of the University of Nebraska, has been authorized under the title of Director of the School of Mining and Metallurgy to bring together into defined courses the work now given in the University pertinent to mining and metallurgy, and to arrange for the enrollment of students therein.

W. A. SCOTT, staff correspondent of the MINING AND SCIENTIFIC PRESS, is now on one of his periodical tours of Arizona, and, as usual, will contribute a series of interesting articles on the development, production and equipment of the mining industry of that Territory. Managers and superintendents of mines, mills and smelters who can accord Mr. Scott facilities for getting proper data, or show him other courtesies as this paper's representative, will do a favor that will be appreciated by the publisher.

#### Obituary.

JOHN F. DALY, a well-known mechanical engineer of San Francisco, Cal., died at his home in Alameda, Cal., on the 17th inst. Mr. Daly was a native of Maine, 48 years of age, and had lived on the Pacific coast for twenty-five years. He was a pioneer inventor and builder of gas engines and had been for several years secretary of the Union Gas Engine Co. Death was due to brain fever.

#### Commercial Paragraphs.

THE Stilwell-Bierce & Smith-Vaile Co. of Dayton, Ohio, has contracts for fifteen complete pumping outfits for Shanghai, China.

THE Austrian Government has recently placed large orders for dredgers, shovels and other machinery with the Marion Steam Shovel Co., Marion, Ohio.

IN a drilling contest which recently took place at the carnival held at Leadville, Colo., Edward Malley and James Chamberlain of that place won the world's championship and a \$750 prize, establishing the indoor record of 4½ inches in Gunnison granite, the drills used being made of Firth's best tool steel. Their friends are confident that with outdoor work they would make even a still better showing.

AT Los Angeles, Cal., the Kern Power Co. plans to use the water power of the Kern river country and supply electricity for a large portion of southern California; capital stock, \$5,000,000. Amount subscribed: H. E. Huntington \$1,400,000, I. W. Hellman \$380,000, A. Borel \$380,000, C. De Guigne \$380,000, W. G. Kerckhoff \$1,110,000, A. C. Balch \$580,000, H. W. O'Melveny \$210,000, A. Haas \$275,000, Kasper Cohen \$275,000. All except the last two named are directors.

THE Llewellyn Iron Works, manufacturers of the New Standard concentrators, Los Angeles, Cal., have recently furnished New Standard concentrators as follows: Four at the American Girl G. M. Co., Ogilby, Cal.; two at the Con. Golden Trout M. Co., Oroville, Cal.; six at the Hoosier Boy mine, Prairie City, Or.; one at the Mountain Chief mine, Wickenburg, Ariz.;



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| Robins Conveying Belt Co. ....           | 5     |
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| Roesler & Hasselbacher Chemical Co. .... | 1     |
| Rogers, E. B. & Co. ....                 | 1     |
| Rosenberger, A. F. ....                  | 1     |
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| Smooth-On Mfg. Co. ....                  | 15    |
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| State Ore Sampling Co. ....              | 1     |
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| Yewer, J. C. ....                        | 2     |



opposite sides of the form and hold it firmly upon the cylinder. The impression roller has yielding journal-boxes, so that the pressure upon the form can be readily regulated.

### New Patents.

DEWEY, STRONG & CO.'S SCIENTIFIC PRESS PATENT AGENCY, 330 Market St., S. F., has official reports of the following U. S. patents issued to Pacific coast inventors:

FOR THE WEEK ENDING NOVEMBER 12, 1901.

686,391.—PRINTING PRESS—J. F. Ames, Portland, Or.  
 686,432.—ALARM WHISTLE—Bowen, Barnett & Newham, Los Angeles, Cal.  
 686,441.—CAPSTAN—T. G. Cantrell, S. F.  
 686,385.—STEAM MANGLE—Casper & Gerder, Sacramento, Cal.  
 686,398.—SHAVED ICE PERFORATOR—E. G. De Ry, Seattle, Wash.  
 686,447.—FLY TRAP—F. W. J. & W. Fritsch, Sedro Woolley, Wash.  
 686,381.—STOMACH PUMP—W. Gerry, Ventura, Cal.  
 686,691.—WELL CASING PERFORATOR—E. A. Hardison, Los Angeles, Cal.  
 686,396.—WHEELBARROW—O. Hoffmann, Portland, Or.  
 686,657.—MATCH BOXES—J. W. C. James, Portland, Or.  
 686,521.—OILING CABLES—C. Larsen, Crockett, Cal.  
 686,314.—BOOT DRIER—H. C. Mansfield, Chico, Cal.  
 686,417.—EASEL SUPPORT—A. B. Murray, San Rafael, Cal.  
 686,471.—SPEED GEAR—J. M. Ough, S. F.  
 686,373.—BOOK BINDING—B. F. Welker, San Miguel, Cal.

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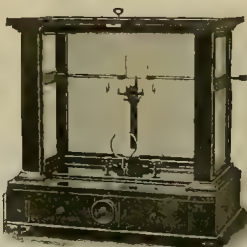
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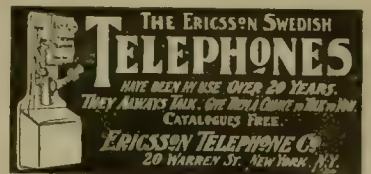
Denver, Colo.

THE CALIFORNIA DEBRIS COMMISSION having received applications to mine by the hydraulic process from W. B. Swank, in the God Run Mine, near Mountain Ranch, Cal. Averts Co., to deposit tailings in a ravine below the mine, from D. Hartley & Co., in the Roanoke Mine, near Placerville, El Dorado Co., to deposit tailings in White Rock Creek; from Wm. McDonald, in the Dardanelles and Oro Placer Mine, near Forest Hill, Placer Co., to deposit tailings in Dardanelles Canon; and from W. S. and C. A. Gooley, in the Smith Bar Mine, near Keep, Plumas Co., to deposit tailings in a worked-out pit, gives notice that a meeting will be held at Room 59, Flood Building, San Francisco, Cal., on December 2, 1901, at 1:30 P. M.

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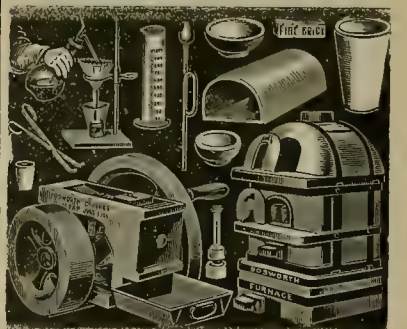
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## ASSESSMENT NOTICES.

**NATIONAL CONS. MINING COMPANY.**—Location of principal place of business, San Francisco, California; location of works, Rich Gulch, Shasta County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 16th day of November, 1901, an assessment (No. 15) of five (5) cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 773 Mission street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 28th day of December, 1901, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on THURSDAY, the 23rd day of January, 1902, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.  
GEO. W. FLEISSNER, Secretary.  
Office—773 Mission street, San Francisco, California.

**ORLEANS CONSOLIDATED MINING COMPANY.**—Location of principal place of business, San Francisco, California; location of works, Grass Valley, Nevada County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 16th day of November, 1901, an assessment (No. 1) of two (2) cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin to the secretary, at the office of the company, 324 Pine street, Room 10, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 28th day of December, 1901, will be delinquent and advertised for sale at public auction; and unless payment is made before, will be sold on THURSDAY, the 30th day of January, 1902, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.  
GEO. P. THURSTON, Secretary.  
Office—324 Pine street, Room 10, San Francisco, California.

**LARKIN MINING COMPANY.**—Location of principal place of business, San Francisco, California; location of works, El Dorado County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 7th day of November, 1901, an assessment (No. 1) of two (2) cents per share was levied upon the capital stock of the corporation, payable immediately to the secretary, at the office of the company, 112 Main street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 14th day of December, 1901, will be delinquent and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 6th day of January, 1902, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

N. F. REMINGTON, Secretary.  
Office—112 Main street, San Francisco, California.

**MORICAN MINING & MILLING COMPANY.**—Location of principal place of business, San Francisco, California; location of works, Tuolumne County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 6th day of November, 1901, an assessment (No. 2) of five (5) cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, No. 300 California street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 4th day of January, 1902, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 3d day of February, 1902, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.  
JNO W. CLASSEN, Secretary.  
Office—No. 300 California street, San Francisco, California.

**THE CALIFORNIA DREDGING COMPANY.**—Principal place of business, 120 Sutter Street, San Francisco, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 22nd day of October, 1901, an assessment (No. 3) of \$10 per share was levied upon the capital stock of the corporation, payable immediately in gold coin, to the secretary of the corporation, at the office of the company, 120 Sutter street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on MONDAY, the 25th day of November, 1901, will be delinquent and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 16th day of December, 1901, to pay the delinquent assessment, together with the cost of advertising and expenses of sale.

SAM. W. CHEYNEV, Secretary.  
120 Sutter Street, San Francisco, California.

**AMERICAN OIL AND REFINERY COMPANY.**—Location of principal place of business, San Francisco, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 21st day of October, 1901, an assessment of five (5) cents per share was levied upon all the subscribed capital stock of the said corporation, payable immediately to J. C. Anthony, secretary of said corporation, at its office, at room No. 323 of the Parrott building, Nos. 825 to 855 Market street, in the City and County of San Francisco, State of California.

Any stock upon which this assessment shall remain unpaid on the 25th day of November, 1901, will be delinquent and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 23rd day of December, 1901, to pay the delinquent assessment, together with costs of advertising and expenses of sale.

By order of the Board of Directors.  
J. C. ANTHONY, Secretary.  
Office—Room 323, Parrott building, Nos. 825 to 855 Market street, San Francisco, California.

## DELINQUENT SALE NOTICE.

**THE THORPE MINING COMPANY.**—Location of principal place of business, San Francisco, California; location of works, Fourth Crossing, Calaveras County, California.

Notice.—There are delinquent upon the following described stock on account of assessment (No. 11) levied on the 8th day of October, 1901, the several amounts set opposite the names of the respective shareholders, as follows:

| Names.                    | No. Cert. | No. Shares. | Amt.   |
|---------------------------|-----------|-------------|--------|
| Mrs. Kate B. Hoffman..... | 74        | 400         | \$4.00 |
| Mrs. Kate B. Hoffman..... | 75        | 400         | 4.00   |
| Mrs. Kate B. Hoffman..... | 160       | 256         | 2.56   |
| Mrs. Kate B. Hoffman..... | 237       | 154         | 1.54   |

And in accordance with law, and an order from the Board of Directors, made on the 8th day of October, 1901, so many shares of each parcel of such stock as may be necessary, will be sold at public auction at the office of the company, 632 Sacramento street, San Francisco, California, on MONDAY, the 9th day of December, 1901, at the hour of 1:30 o'clock P. M. of said day, to pay said delinquent assessment thereon, together with costs of advertising and expenses of sale.

A. F. FREY, Secretary.  
Office—632 Sacramento street, San Francisco, California.

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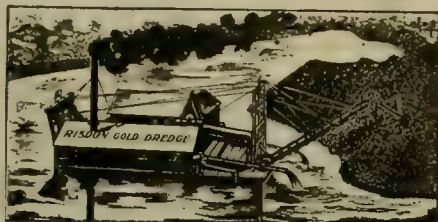
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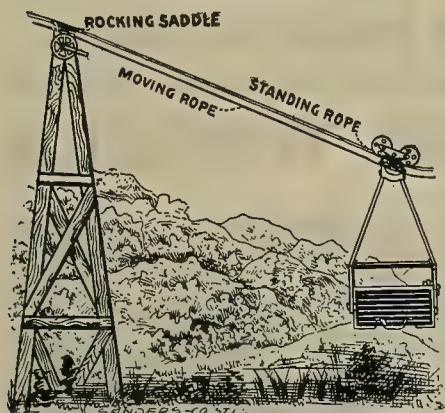
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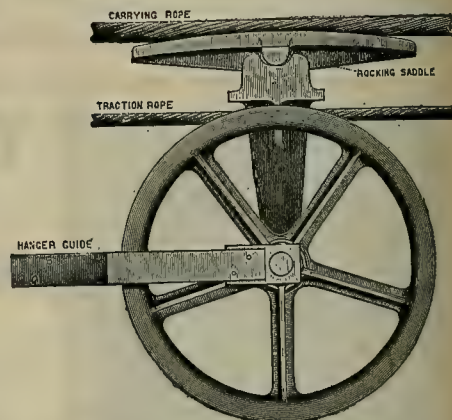
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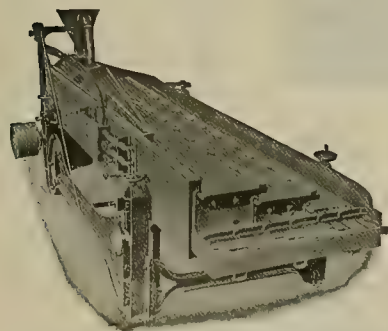
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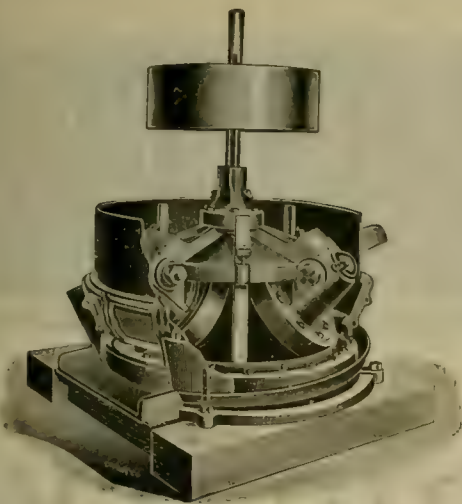
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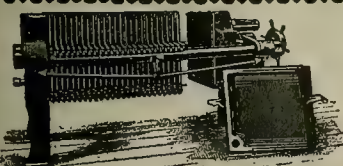
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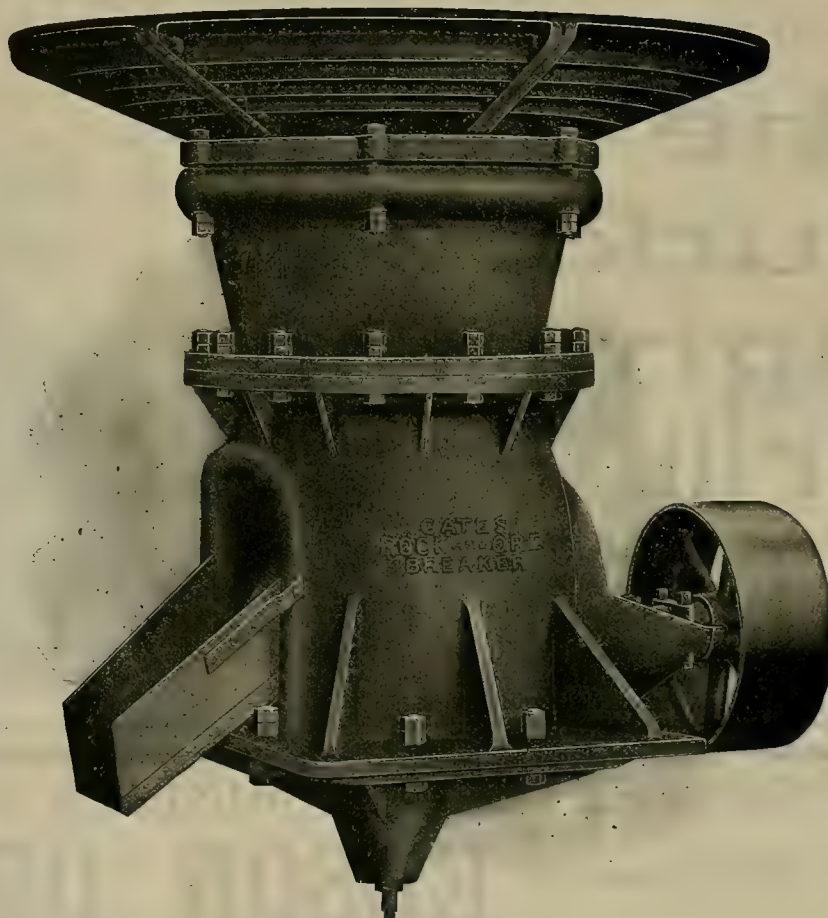
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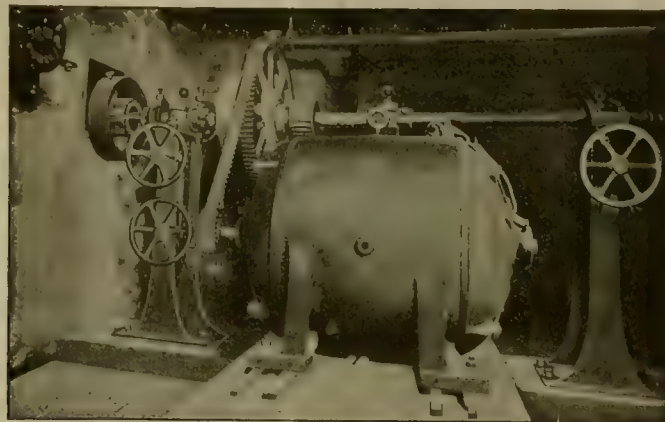
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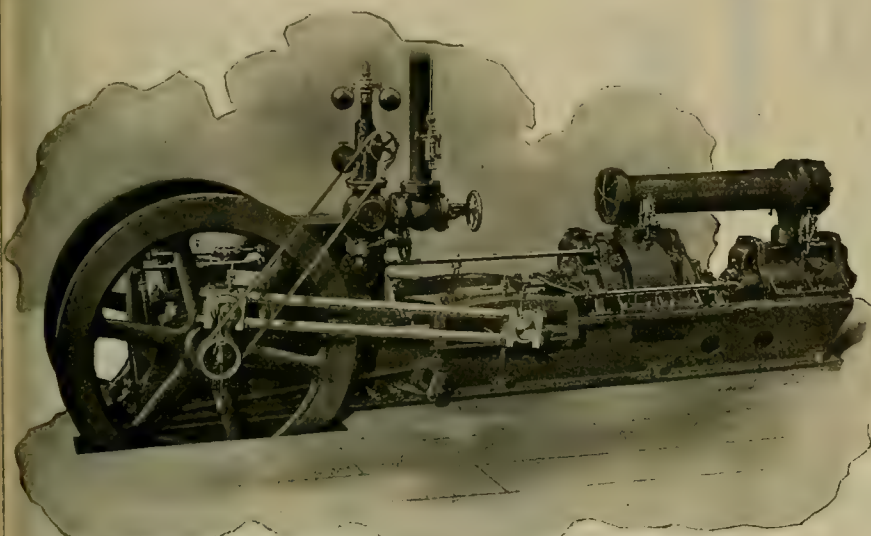
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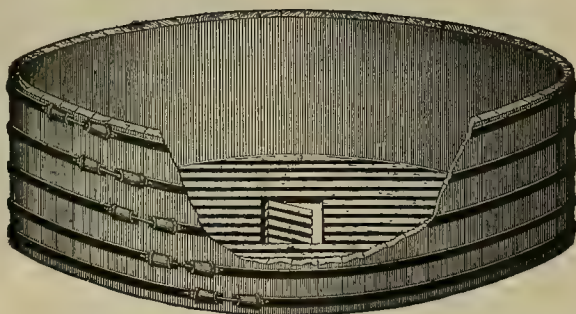
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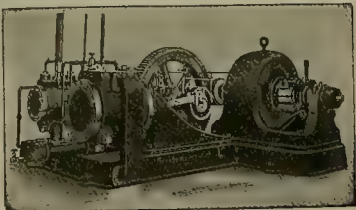
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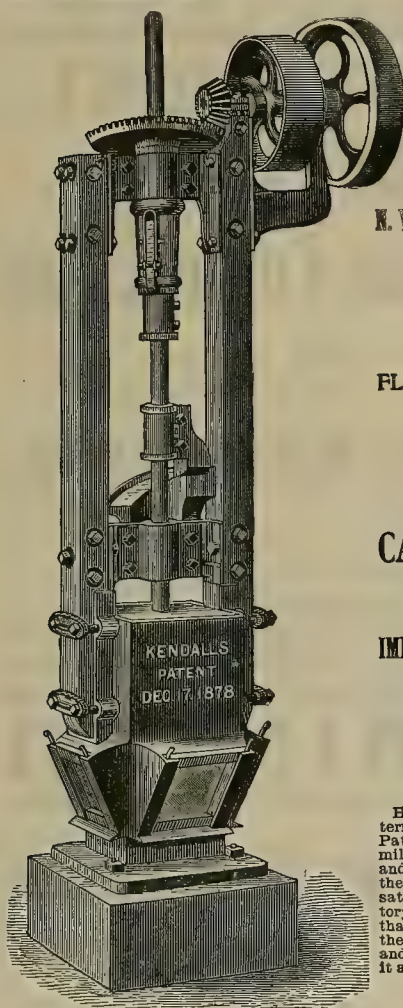


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Having renewed our contract on more advantageous terms with Mr. S. Kendall for the manufacture of his Patent Quartz Mill, we are enabled to offer these mills at **Greatly Reduced Prices**. Having made and sold these mills for the past 16 years, we know their merits, and know that they have given perfect satisfaction to purchasers, as numbers of commendatory testimonials prove. We feel confident, therefore, that at the prices we are now prepared to offer them, there is placed within the reach of all a light, cheap and durable mill that will do all that is claimed for it and give entire satisfaction.

MARSHUTZ & CANTRELL

Send for Circulars and Price List.



### Prospecting Machinery.

Multitudes in use for testing for minerals. Sizes and equipments to suit any and all conditions. Unexcelled for Placer Testing, Oil Wells, Water Wells, testing for Lead and Zinc, Iron and Coal; goes through anything; brings up everything. Large sizes drill as much as 1500 feet. In use all over the world. Every purchaser pleased. Used on boats for testing river and lake beds. Water no hindrance. No skilled labor required.

KEYSTONE DRILLER CO., Beaver Falls, Pa., U. S. A.

### Are You Confronted With a Difficult Ore-Separating Problem?

THE WETHERILL MAGNETIC SEPARATING PROCESS

may prove the solution. Apply to Wetherill Separating Company, 52 Broadway, N. Y.

### Aaron's Assaying, PARTS II and III. THIRD EDITION --- REVISED AND REWRITTEN.

New type; new illustrations; new matter; better than ever; reduced in price to \$1.50 postpaid to any part of the world. The practical character of this book has made it the favorite everywhere in the mining world among men who want such a manual on assaying.

Address Book Dept. Mining and Scientific Press,  
330 MARKET ST., SAN FRANCISCO, CAL.

## EXPERT TESTIMONY.

You need not rely wholly upon our word as to the superiority of Jeanesville Pumps.

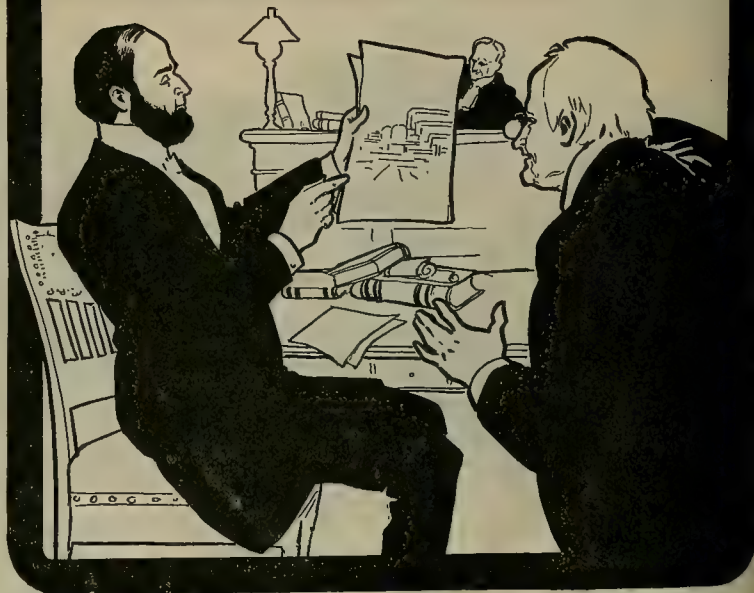
We have letters in proof of our claims from engineers all over the world, the testimony of experts—men who understand mine pumping and practical mining machinery. Some of them are probably well known to you.

We will gladly send copies of their letters if you have any doubt of the merit of Jeanesville Pumps.

We claim that in Jeanesville Pumps is embodied the most practical combination of simplicity, accessibility, steam economy, capacity and durability. In a word, that they are the best obtainable.

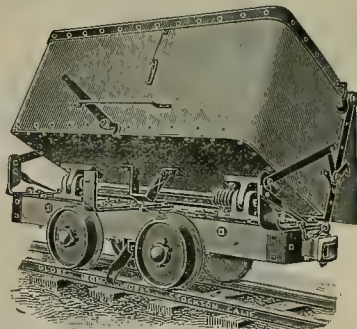
**JEANESVILLE IRON WORKS CO.,**  
JEANESVILLE, PA.

DENVER OFFICE,  
1328 SEVENTEENTH ST.



## TRUAX AUTOMATIC ORE CARS.

Cost No More Than  
Common Cars.



Special Side Dump Car—Patented.

We build these cars in a shop devoted exclusively to their manufacture, using the best quality of STEEL and MALLEABLE IRON, thus assuring strength and durability. . . . .

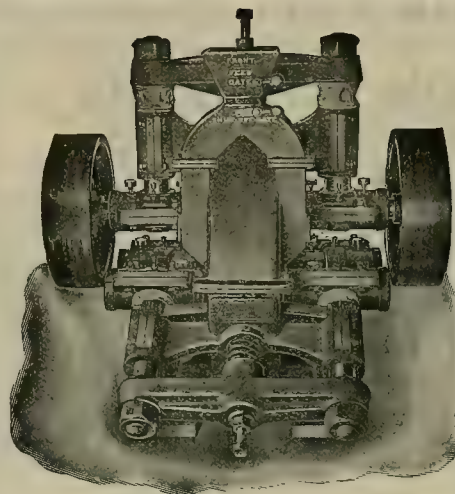
All Cars equipped with SELF-OILING WHEELS and MALLEABLE IRON DUST CAPS. . . . .

## GLOBE IRON WORKS, Stockton, Cal.

SOLE MANUFACTURERS FOR THE PACIFIC COAST.

Sold by Dealers.

Send for Catalogue.



FRONT VIEW OF THE

## KENT DRY PULVERIZER.

Reduces the hardest ores, and makes best product for any treatment. Combines best wearing qualities, economy of power and great capacity. Runs 24 hours every day without stoppage for oiling, adjustment or repairs. Shipped as shown, ready to run.

Guaranteed for 1 Year.

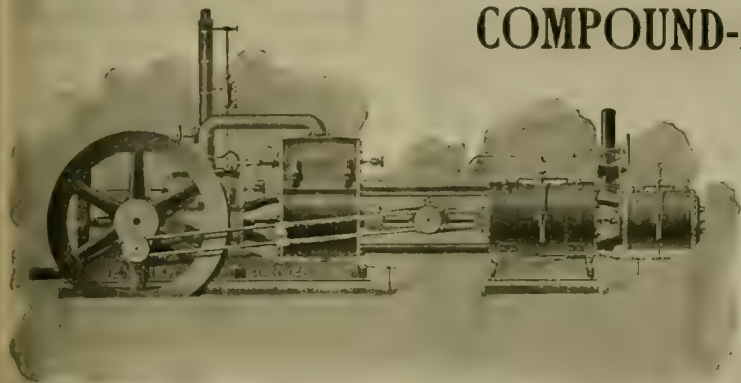
**KENT MILL CO.,**  
5 BEEBEAN STREET, NEW YORK.

DEWEY, STRONG & CO., Patent Solicitors, 330 Market St., San Francisco, Cal.



== WE ILLUSTRATE HERE ONE OF OUR NEW ==

# TANDEM, STRAIGHT-LINE, COMPOUND-STEAM, COMPOUND-AIR COMPRESSORS,



FOR WHICH WE CLAIM  
Highest Economy in Fuel  
Consumption,  
Highest Efficiency in  
Service,  
Smallest Requirement of  
Floor Space,  
Lowest Cost of Foundation  
and Installation.

AIR COMPRESSORS  
BUILT ESPECIALLY FOR  
MINING WORK.

SIMPLE OR COMPOUND-STEAM  
COMPRESSORS. WATER-  
POWER OR ELECTRIC DRIVEN.

STRAIGHT-LINE AND UPRIGHT  
TYPES. BELT-DRIVEN.  
SINGLE OR DUPLEX.

LOW PRESSURE COMPRESSORS  
FOR PNEUMATIC CYANIDE  
TREATMENT OF ORES.

**J. GEO. LEYNER,**

OFFICE 729 SEVENTEENTH STREET.  
WORKS, COR. 36th AND WAZEE STS.

**Denver, Colo.**

## ROCK DRILLS AND

## AIR COMPRESSORS

OF ALL SIZES AND TYPES.

## RAND DRILL CO.

128 BROADWAY,  
NEW YORK.

223 FIRST ST.,  
SAN FRANCISCO.

## RIX COMPRESSED AIR & DRILL CO. NORTH STAR STEEL BABY DRILL.

— MANUFACTURERS OF —

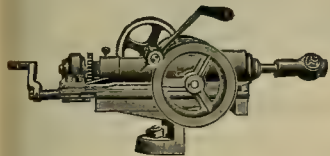
Rock Drills, Air Compressors, Mining Hoists, and Pumps for Compressed Air.  
Corliss Engines, Boilers, and Steam Appliances.

ALSO AGENTS FOR LAIDLAW-DUNN-GORDEN COMPRESSORS.

396-398 Mission St., Cor. Fremont, San Francisco, Cal.

NOT AN EXPERIMENT; IN GENERAL USE THROUGHOUT THE WORLD

## THE NEW JACKSON HAND POWER ROCK DRILL.



Made of Steel. Guaranteed against  
breakage for two years.

H. D. CRIPPEN, Sole Manufacturer,  
NEW YORK, DENVER, COLO.  
52 Broadway, 1756 Larimer St.

WRITE FOR CATALOGUE.

## DIAMOND



For Prospecting Mineral  
Lands and Veins.  
Take out a solid core giv-  
ing perfect sample of  
material penetrated.  
Machines for any depths,  
and for Steam, Com-  
pressed Air, Hand or  
Horse Power.

Send for Catalogue.

AMERICAN DIAMOND ROCK DRILL CO.,  
120 LIBERTY ST., NEW YORK.

**ROCK DRILLS**

Established 1837.

**I. C. Yawger,**

Successor to VICTOR BISHOP & CO.



21 Maiden Lane, NEW YORK.

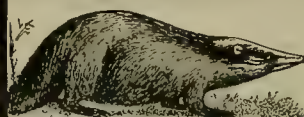
AFRICAN, YABERSMONT and BRAZIL BORTZ

Importer of

**CARBON**  
(Black Diamonds.)  
— FOR —  
**DIAMOND DRILLS**  
AND  
Mechanical Purposes.  
**S. DESSAU,**  
9 Maiden Lane,  
New York,  
N. Y.  
ESTABLISHED 1870  
Best Quality at Lowest Prices

## THE "NEW BADGER" ROCK DRILL

A "New Badger" Drill will do great execution  
with a minimum of steam or air. You need our  
catalogue.

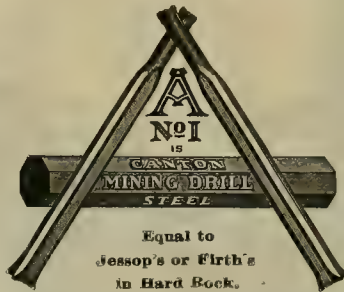


THE PHILLIPS  
ROCK DRILL CO.,

42 N. 7th St.,  
Philadelphia, Pa.



If you require a high grade steel possessing toughness and  
durability, why not try



## CANTON BRANDS.

THEY HAVE NO EQUAL FOR

**Hard Rock Mining.**

SCHAW, INGRAM, BATCHER & CO.,  
SACRAMENTO — SAN FRANCISCO.

HARPER & REYNOLDS CO.,  
LOS ANGELES.

## FIRTH'S DRILL STEEL. USE THE BEST.

Has no equal in Hard Rock Drilling.

ABNER DOBLE COMPANY, GEN. AGTS.,  
FREMONT AND HOWARD STS., SAN FRANCISCO.

Sold by Seattle Hardware Co., Seattle, Wash.

TO SECURE  
GOOD  
RESULTS  
BUY

## JESSOP'S STEEL

FOR TOOLS, MINING DRILLS, ETC.

Chief American Office,  
91 John St., New York, N. Y.

Wm. Jessop & Sons, Ltd.  
Manufacture, Sheffield, England.

I. WILLARD BEAM, Agent,  
29 MAIN STREET,  
SAN FRANCISCO, CAL.

## PATENTS

Obtained in all civilized countries. Expense saved inventors  
by preliminary searches. Communications confidential.  
Inventors' guide free on request. DEWEY, STRONG & CO.  
(Established 1860), 330 Market Street, San Francisco, Cal.,  
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## MINING INVESTOR

Answers all questions concerning Mining  
Companies of Colorado

**\*FREE OF CHARGE TO SUBSCRIBERS.**

Write for sample copies and full particulars to  
THE MINING INVESTOR, Colorado Springs, Colo.

## MICHIGAN COLLEGE OF MINES.

An Engineering School with unique location, giv-  
ing it unusual facilities. Distinctive methods of  
instruction. Special courses given. All work in  
charge of widely experienced men. Catalogue giv-  
ing list of graduates and their occupations on ap-  
plication. Address

F. W. McNAIR, Pres't, Houghton, Mich.



# WIRE ROPE

AND Aerial WIRE ROPE TRAMWAYS

A. LESCHEN & SONS ROPE CO.

920 - 922 NORTH FIRST ST. ST. LOUIS, MO.

47 - 49 SOUTH CANAL ST. CHICAGO, ILLS.

92 CENTRE ST. NEW YORK, N.Y.



# HEALD'S

BUSINESS COLLEGE

And School of Practical Sciences.

24 Post Street, - - - San Francisco.

MINING AND CIVIL ENGINEERING DEPARTMENT: Mathematics, Drafting, Strength of Material, Chemistry, Assaying, Blow-Pipe Analysis, Geology, Mineralogy, Surveying, etc.

ELECTRICAL DEPARTMENT: Theory and Practice; Construction Mechanical Drawing.

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Twenty-eight teachers; individual instruction; can enter at any time; Catalogue and Journal free.

## The Mining Man's Favorite Route IS VIA



BETWEEN  
Denver, Colorado Springs, Pueblo and Florence, Cripple Creek, Leadville, Glenwood Springs, Aspen, Gunnison, Lake City, Creede, Durango, Silverton, Telluride and Ouray. Bingham, Tintic, Park City, Mercur, Marysville, Gold Mountain, Deep Creek and La Sal.

Reaching all the Mining, Milling, Cyaniding, Chlorinating and Smelting centers in Colorado and Utah, and all mining points in California, British Columbia and the Pacific Northwest by close connections and a perfect system of through car service.

Pullman Palace and Tourist Sleeping Cars between Denver and San Francisco and Los Angeles, and Pullman Palace and Tourist Sleeping Cars and Free Reclining Chair Cars between Denver and Portland. . . . A Perfect Dining Car Service on All Through Trains. . .

For Illustrated Pamphlet, address:  
GEO. W. HEINTZ, S. K. HOOPER,  
A. G. P. & T. A., G. P. & T. A.,  
Salt Lake City, Denver, Colo.,  
Utah.

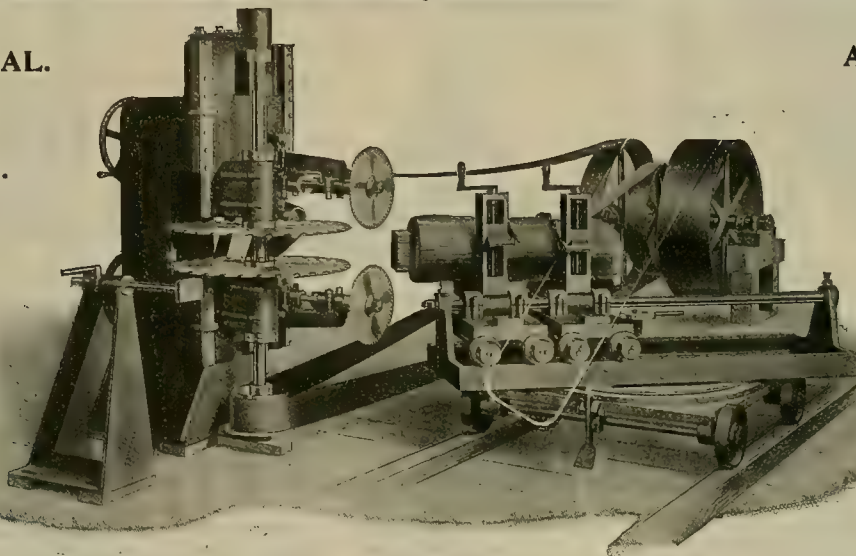
## THE LIFE AND EFFICIENCY OF MINE TIMBERS

depends upon the accuracy of framing. THE DENVER TIMBER FRAMER will cut tenons perfectly true on the roughest timbers and does the work of fifteen men. Under ordinary conditions this machine will pay for itself within one year.

ECONOMICAL.

SAVES  
LABOR.

RAPID.



ACCURATE.

SAVES  
TIME.

SIMPLE.

## THE KLONDIKE OF ARIZONA.

THE Prescott and Eastern Railroad

ENTERS AN

Extremely Rich Mining Country.

The opening of this road makes easy of access one of the Richest Gold and Copper Mining Districts in the World. Hundreds of prospectors are turning their attention to this section.

Take the Santa Fe System to Ash Fork, thence via the SANTA FE, PRESCOTT & PHOENIX RY. to Prescott. This latter road also reaches Wickenburg, where is located the great Vulture Gold Mine and where the recent marvelous gold strike was made in the Oro Grande.

For further information and descriptive literature, address H. P. ANEWALT, Gen. Frt. & Pass Agt., PRESCOTT, ARIZ.

Hoskins' Patent Hydro Carbon Blow-Pipe and Assay Furnaces.



No dust. No ashes. Cheap, effective, economical, portable and automatic.

SEND FOR PRICE LIST TO

W. HOSKINS, 81 South Clark St., Room 54, CHICAGO, ILL.

## THE DENVER MINE TIMBER FRAMING MACHINE,

MANUFACTURED BY THE DENVER ENGINEERING WORKS CO., DENVER, COLO.  
PARKE & LACY CO., SAN FRANCISCO, SALES AGENT FOR PACIFIC COAST.

## C. H. EVANS & CO., Machine Works,

183-185-187 FREMONT STREET,

Where, with Enlarged and Increased Facilities, they are better than ever prepared to do

First-Class Machine Work

Promptly, and at Reasonable Prices, and will continue the manufacture of

Thomson & Evans Steam Pumps.

Deep Well Pumps, Power Pumps, Etc.,

Also Marine Engines, Ship and Steamboat Work, Pipe Cutting, General Jobbing and Repairing



## CRANE FITTINGS

ESTABLISHED 1855

## Crosscup's XXX Boiler Compound Is Guaranteed

To Remove and Prevent Scale. To Stop and Prevent Pitting and Corrosion.  
To Stop Priming and Keep Boilers in First-Class Condition for Less Cost per H. P. Than Any Other Compound on the Market.

I. O. CROSSCUP, 532 California St., San Francisco.

## McFARLANE & CO.,

1734 FIFTEENTH ST., DENVER, COLO.

## Mining and Milling Machinery.

STAMP AND CONCENTRATING MILLS BUILT  
AND ERECTED.

STEAM AND ELECTRIC HOISTS, CRUSHERS, ROLLS, REVOLVING SCREENS, JIGS,  
ORE CARS, CYANIDE TANKS, CORNISH PUMPS, CORLISS ENGINES.

## JOHN WIGMORE & SONS CO.,

HEAVY HARDWARE.

Construction and Equipment Supplies.

MACHINERY.

Engineers and Contractors, LOS ANGELES, CAL.

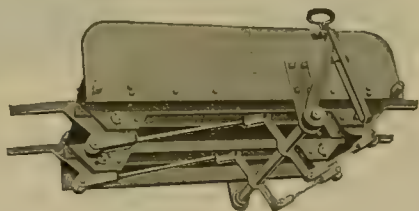


MINE MANAGERS SHOULD READ THIS.

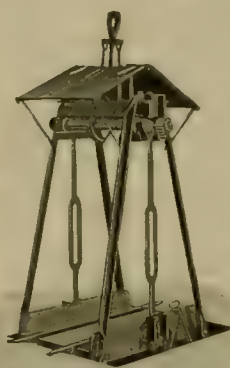
# The JELINEK Safety Cage Chairs

are absolutely safe and much cheaper than shaft chairs. Can be operated from the cage; from any level, without reaching into the shaft; from the collar of the shaft; and by a lever located on the engineer's stand. The chairs when thrown out form an extension of the track from the cage level

to the shaft level. We are prepared to build cages equipped with these chairs, or shaft chairs to be adapted to cages now in use. Correspondence solicited.



Showing Cage Bottoms with Chairs Thrown Out.



Showing Cage, Style No. 2, Equipped with Jelinek Chairs, as Landed at Level.



Showing Cage, Style No. 2, Equipped with Jelinek Chairs, Illustrating How Chairs Drop Automatically Into Shaft When Cage is Hoisted.

MANUFACTURED EXCLUSIVELY BY

## The Hendrie & Bolthoff M'f'g & Supply Co.

DENVER, COLO., U. S. A.

# THE MAP SHOWS--

The shaded part shows that where the most metal mining is done the MINING AND SCIENTIFIC PRESS has the largest part of its circulation. It tells its own story. The MINING AND SCIENTIFIC PRESS is the only mining paper that has a general circulation therein.

Every advertiser in the MINING AND SCIENTIFIC PRESS, whether he pays for an inch or a page, knows that he weekly talks to the men who do the buying. He knows his audience just as sure as though he could look into their faces or shake hands with them. He knows that his announcement is weekly seen by the men throughout this west half of America who are thoroughly representative of the great metal mining industry of the country.

The readers of this paper have bought mining machinery and supplies to the extent of over \$150,000,000 in the last ten years, and their annual purchases now exceed \$18,000,000. Its advertising pages are referred to everywhere by intending purchasers of mining machinery or supplies as a directory for that purpose. The paper refuses questionable advertising, and its thousands of readers learned long ago, to their satisfaction, that the appearance of an advertisement in its columns is of itself good

evidence of reliability. An advertiser in this paper is in good company.

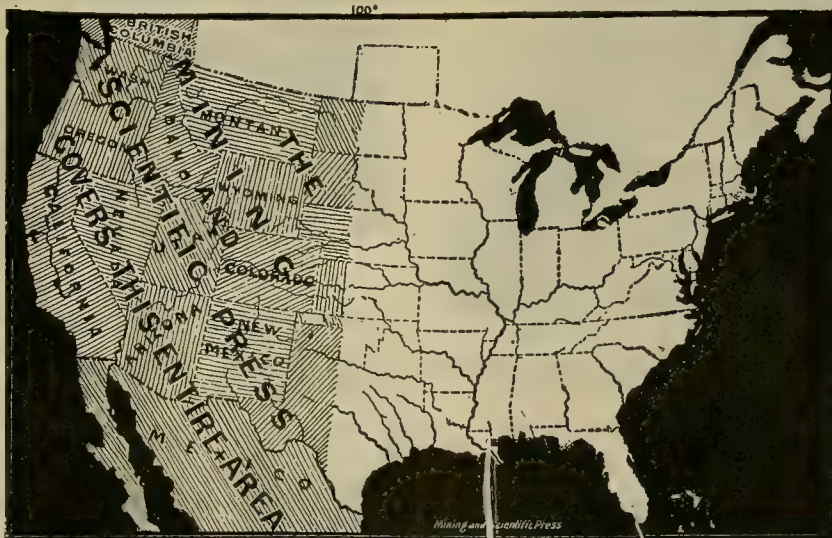
In advertising, results are what count. It is not what an advertisement costs, but what it produces, that determines its value. Leading concerns

who continuously buy advertising space herein, say that it is not an experiment, but a profitable investment to advertise in the MINING AND SCIENTIFIC PRESS. Its rates, comparatively, are "cheaper" than those of any other similar publication. "Cheapness" is not regulated by what you pay, but by what you get for what you pay. Advertising in this paper, if properly backed up by what is advertised, insures profitable publicity.

The region shaded on the map has a POPULATION OF TEN MILLIONS --- MINING IS ITS CHIEF INDUSTRY.

No advertiser who sells to mining men would omit using this journal if he knew the truth about it.

If from any reason anyone thinks "Advertising doesn't pay," we would like to furnish him with evidence that the right kind of advertising does pay. Economy in advertising is like economy in everything else—judicious expenditure of money. The results of an advertisement are what determines its value.



## MINING AND SCIENTIFIC PRESS,

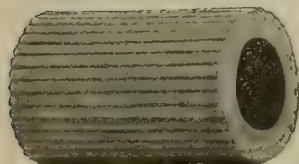
330 MARKET STREET,

SAN FRANCISCO, CALIFORNIA.



**PACIFIC COAST RUBBER CO.,**

21 FIRST STREET, SAN FRANCISCO, CAL.

**Corrugated Pneumatic Hose.**

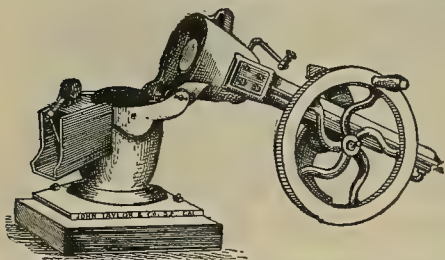
Made absolutely seamless in the fabric as well as in the cover. So constructed as to form, practically, a compact body. No splitting of the tube and opening of the plies, much lighter and more pliable, and will stand shorter bends without kinking than hose made in the ordinary way; will withstand a greater air pressure than any hose double its weight offered on the market. We guarantee this hose to outwear any other style or make of hose for the conducting of air under pressure, whether for drills, hoists or pneumatic tools, and we are satisfied, beyond any doubt, that for this work it is by far the most desirable and economical hose manufactured.

Plain; Wound with Flat or Round Wire; or Covered with Woven Marline Jacket. Sizes 3-8, 1-2, 3-4 and 1 Inch.

**JOHN TAYLOR & CO.,**

63 First Street, SAN FRANCISCO, CALIF.

—IMPORTERS AND DEALERS IN—



The above cut represents our Portable One-Stamp Mill opened for cleaning, or to take apart for transportation. It can be run by hand or belted for power.

Total weight of mill.....405 lbs.  
" " upper half.....205 "  
" " lower half.....200 "

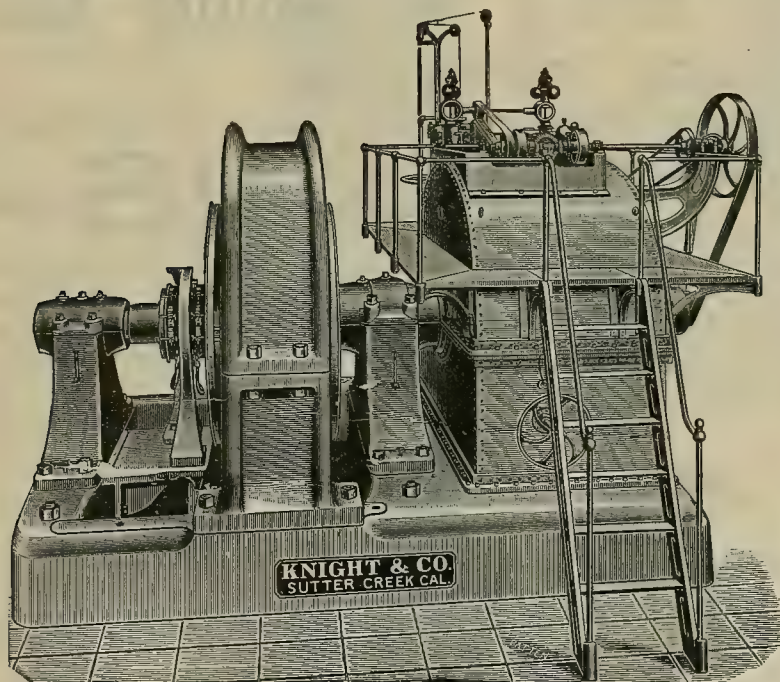
Price \$100. Write for special illustrated circular.

Assayers' and Laboratory Supplies,  
Mine and Mill Supplies,  
Chemicals and Chemical Glassware,  
Merck's and Baker & Adamson's C. P. Chemicals,

Cyanide of Potassium and Zinc Shavings, all Balances of Standard Makes, School and Philosophical Apparatus a Specialty.

Our Specialties: Portable One-Stamp Mill. Hand and Power Rock Crusher. Combined Coal Oil and Gasoline Burner for Assay Furnaces.

Scientific and Technical Books. Catalogue on Application.

**KNIGHT'S WATER WHEEL.**

The accompanying cut shows the general arrangement of The Knight Water Wheel, direct coupled to a 750 kilowatt generator, with governor mounted on top of wheel casing.

These wheels are designed for 100 to 2500 H. P. Highest efficiency and regulation guaranteed. WHEELS FROM 6 TO 24 INCHES, ENCLOSED IN CAST-IRON CASING.

Wheels for mill and reversible hoisting works a specialty.  
**KNIGHT & CO., Sutter Creek, Cal.**

For full particulars, send for descriptive catalogue.

**"PNEUMATIC" CYANIDE PROCESS.**

(Patented in U. S., So. African Republic, New Zealand, Victoria, New So. Wales, So. Australia.)



WILL DO IN 7 HOURS WHAT REQUIRES FROM 2 TO 6 DAYS BY OLDER METHODS.  
SEND FOR PAMPHLET.  
THE PNEUMATIC CYANIDE PROCESS CO., 306 Boston Bldg., Denver, Colo.

**California Vigorit Powder Co.**

—Manufacturers of—

Dynamite High Explosives and "Vigorit Low" Blasting Powder.

OFFICE: 203 CALIFORNIA STREET,  
SAN FRANCISCO, CAL.

WORKS: POINT ISABEL,  
CONTRA COSTA CO., CAL.

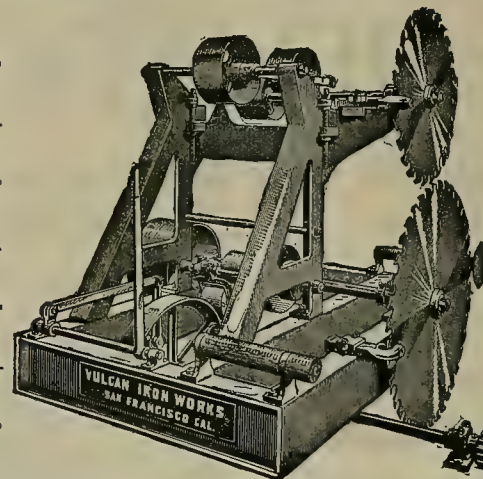
**Portable Saw Mills.**

No. 0  
Single Circular.  
4000-6000 feet  
per day.

No. 1  
Single Circular.  
8,000-10,000 ft.  
per day.

No. 2  
Double Circular.  
15,000-20,000 ft.  
per day.

No. 3  
Double Circular.  
20,000-25,000 ft.  
per day.



For  
Mining  
Companies

—OR—  
Other Consumers  
of Lumber at  
Remote Points.

SEND FOR  
CATALOGUE.

Manufactured by

**VULCAN IRON WORKS,** Office, 505 Mission Street,  
SAN FRANCISCO, CAL.

**CAMERON STEAM PUMPS.**

SIMPLE  
COMPACT  
DURABLE  
RELIABLE  
EFFICIENT

NO OUTSIDE VALVE GEAR  
EASILY STARTED EASILY STOPPED  
NO DEAD CENTER  
BUILT FOR HARD USAGE  
SUITABLE FOR EVERY USE



Special Patterns  
adapted for Heavy  
Duty in all  
Mining Work.

Our new 112-page Catalogue sent on request.

**A. S. CAMERON STEAM PUMP WORKS,**  
FOOT EAST TWENTY-THIRD STREET, NEW YORK.

**TURBINE AND CASCADE WATER WHEELS**

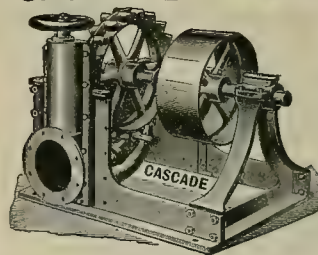
Adapted to all Heads from

**3 FEET to 2000 FEET.**

Our experience of 39 YEARS building Water Wheels enables us to suit every requirement of Water Power Plants. We guarantee satisfaction.

Send for a Pamphlet of either Wheel and write full particulars.

**JAMES LEFFEL & CO.**  
SPRINGFIELD, OHIO, U. S. A.

**THE McCORMICK TURBINE.**

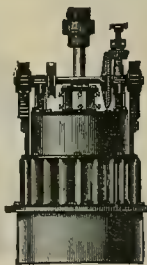
FEATURES WORTH CONSIDERATION:

Great Capacity, High Speed, Unequaled Efficiency,  
Steady Motion, Easy Working Gate,  
Greatest Power from a Limited Quantity of Water, at Smallest Cost.

UNDOUBTEDLY THE MOST POPULAR TURBINE MANUFACTURED.

WRITE FOR CATALOGUE

**S. MORGAN SMITH COMPANY,**  
YORK, PA., U. S. A.

**NONPAREIL ANTI-FRICTION METAL.**

BEST ANTI-FRICTION METAL FOR ALL  
MACHINERY BEARINGS. FOR HIGH  
SPEED AND HEAVY CRUSHING  
WEIGHT IT HAS NO EQUAL.

**THEO. HIERTZ & SON,** Sole Manufacturers, TENTH AND POEPPING STREETS,  
ST. LOUIS, MO. Manufacturers of all grades Babbitt Metals, Solder, Bar Tin, Bar Lead,  
Lead Car Seals, Pig Tin, Pig Lead, Antimony, Copper, Spelter, etc.



## Trade Paper Advertising.

It is very easy to go wrong in the matter of trade paper advertising. One temptation is to go into several without much reference to their circulation, stability, value, influence, or reliability, but there is hardly ever more than one paper in a trade that is first rate as an advertising medium. Since it is the leading paper in that trade, it is apt to reach nearly everybody of consequence in the business, whereas the circulation of the others, or of most of them, is likely to be largely a duplication. There are apt to be several very good reasons why that particular leading paper is the leading paper. It has the right kind of matter in it or it wouldn't be subscribed for so generally. It is usually on a firm foundation, and hence it conducts all of its affairs purely on a business basis. No fear, no favor; the same treatment for all, and that fair business treatment. All this, besides giving a publication the effective support of the trade—by means of which it is enabled to make money and to be independent—also gives the publication a character for reliability which helps the advertising as well as the reading matter—helps to make the advertising interesting, helps to make the reader think that the advertising is true. Another mistake that some make in reference to the trade paper is that they just put in a card—any old thing will do, you know—and let it go at that. The space that they buy is their own. Why shouldn't they make the best possible use of it, then? Why shouldn't they take pains with the preparation of their copy? Why shouldn't they change the matter often, perhaps in every issue? Why shouldn't they assume that the reader of the paper in question will follow the advertising pages generally, and their own advertising matter in particular, if there is live, fresh news in them?

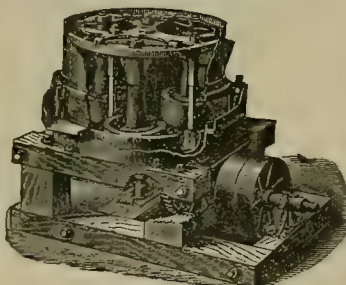
An ANALYSIS of the Coal, Fuel Oil, Lubricating Oils, Boiler Compounds, Greases, Cleaning Compounds, Building Materials, Brasses, Metals and other substances or preparations you may be using, will sometimes open your eyes and save big money.  
Can You Use Us?

ANALYTICAL DEPARTMENT.  
**DEARBORN DRUG & CHEMICAL WORKS,**  
27, 28, 29, 30, 31, 32, 33 & 34 Rialto Building,  
CHICAGO, ILL.  
WM. H. EDGAR, President. Telephone, Harrison 1358 & 1373.

**CYANIDE 98%**  
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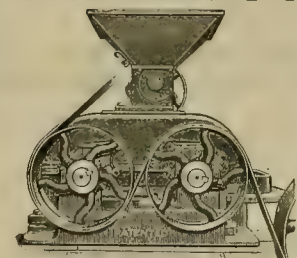
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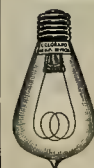
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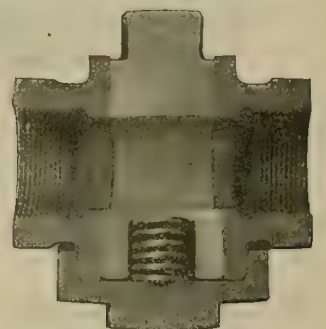
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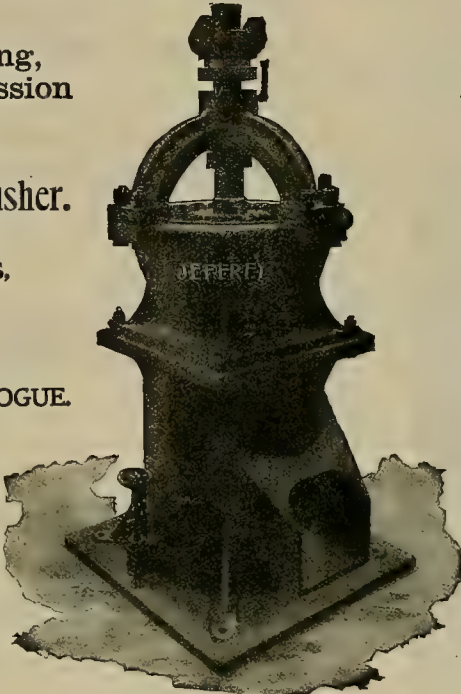
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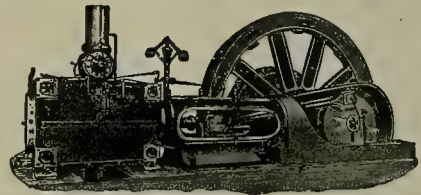
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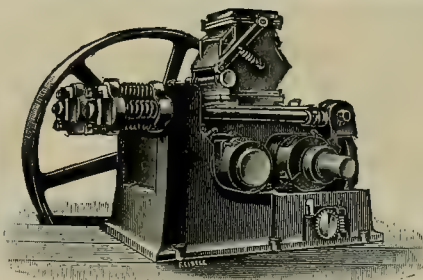
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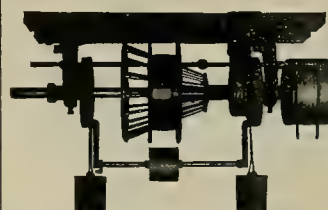
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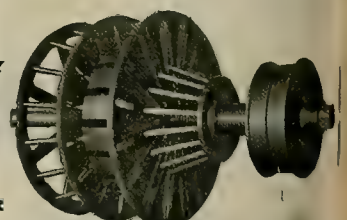
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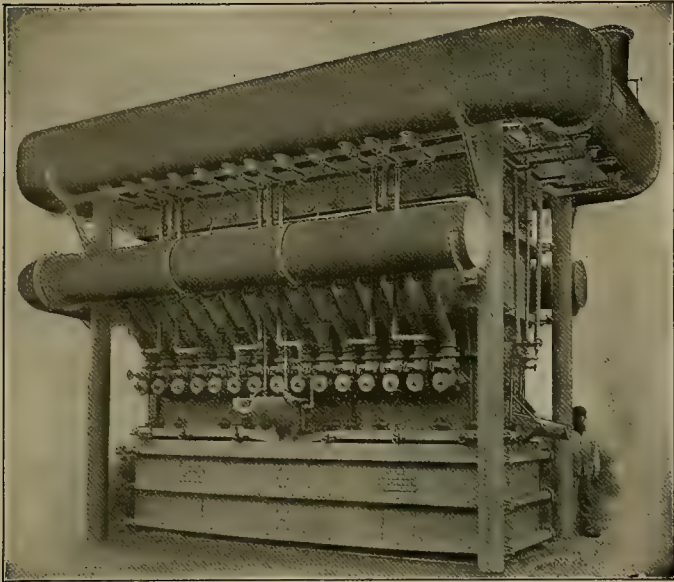
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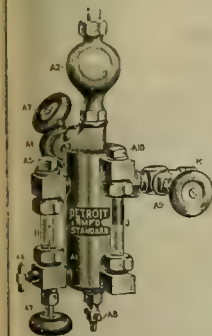
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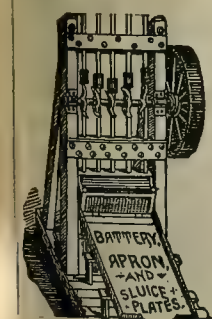
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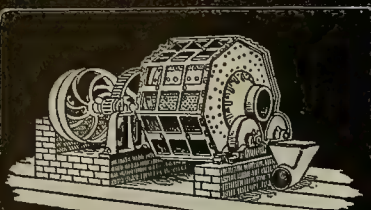
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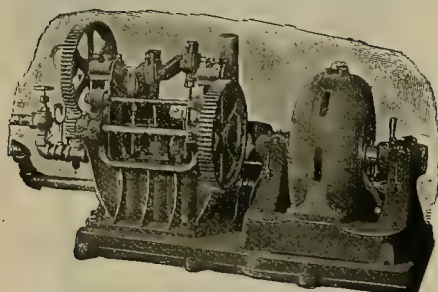
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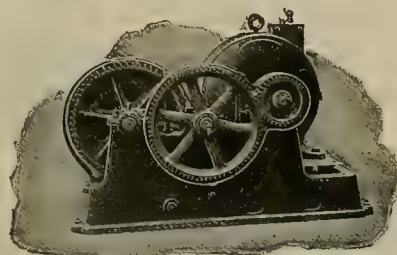
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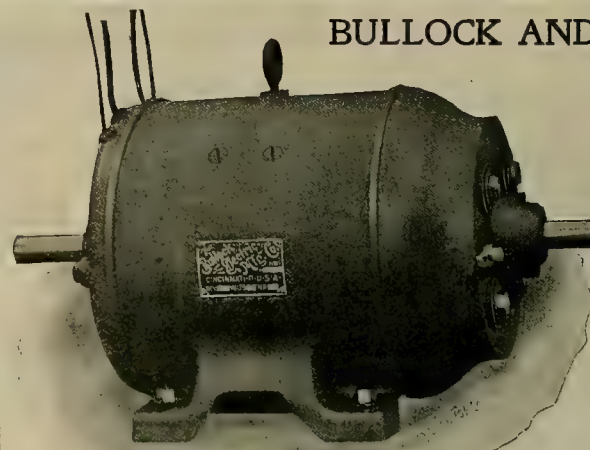
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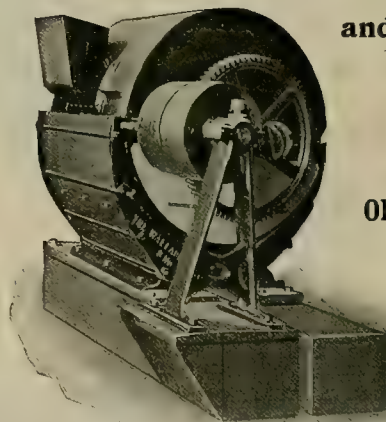
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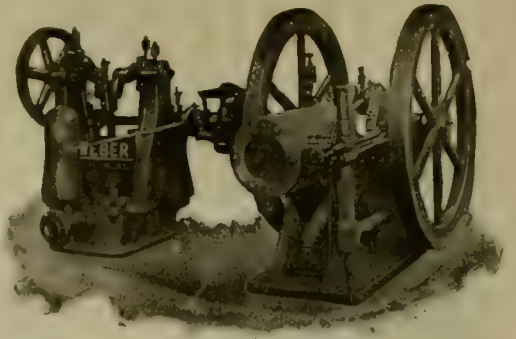
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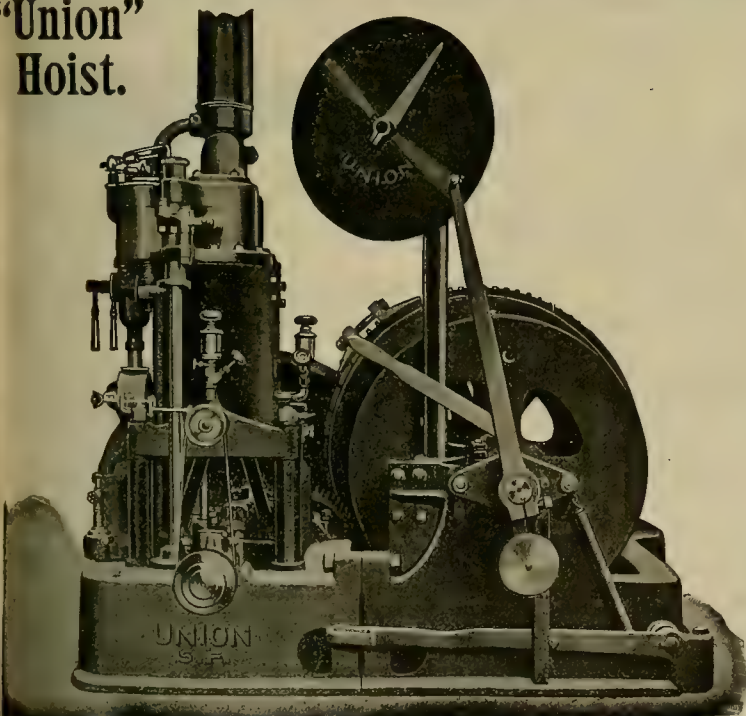
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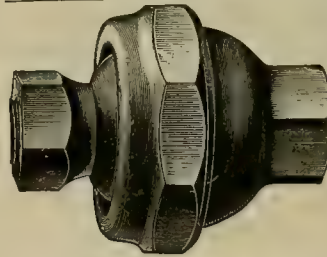
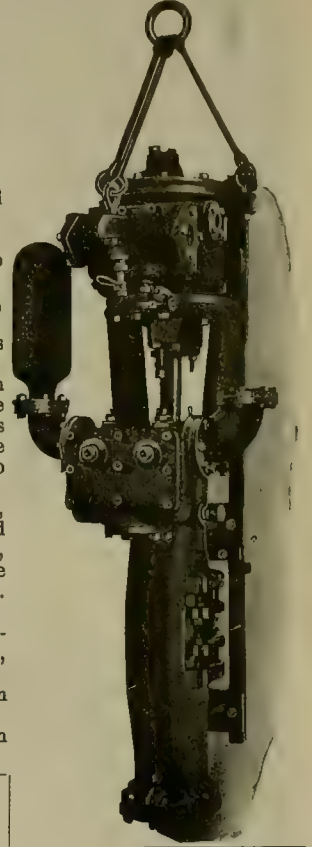
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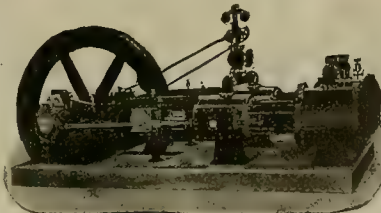
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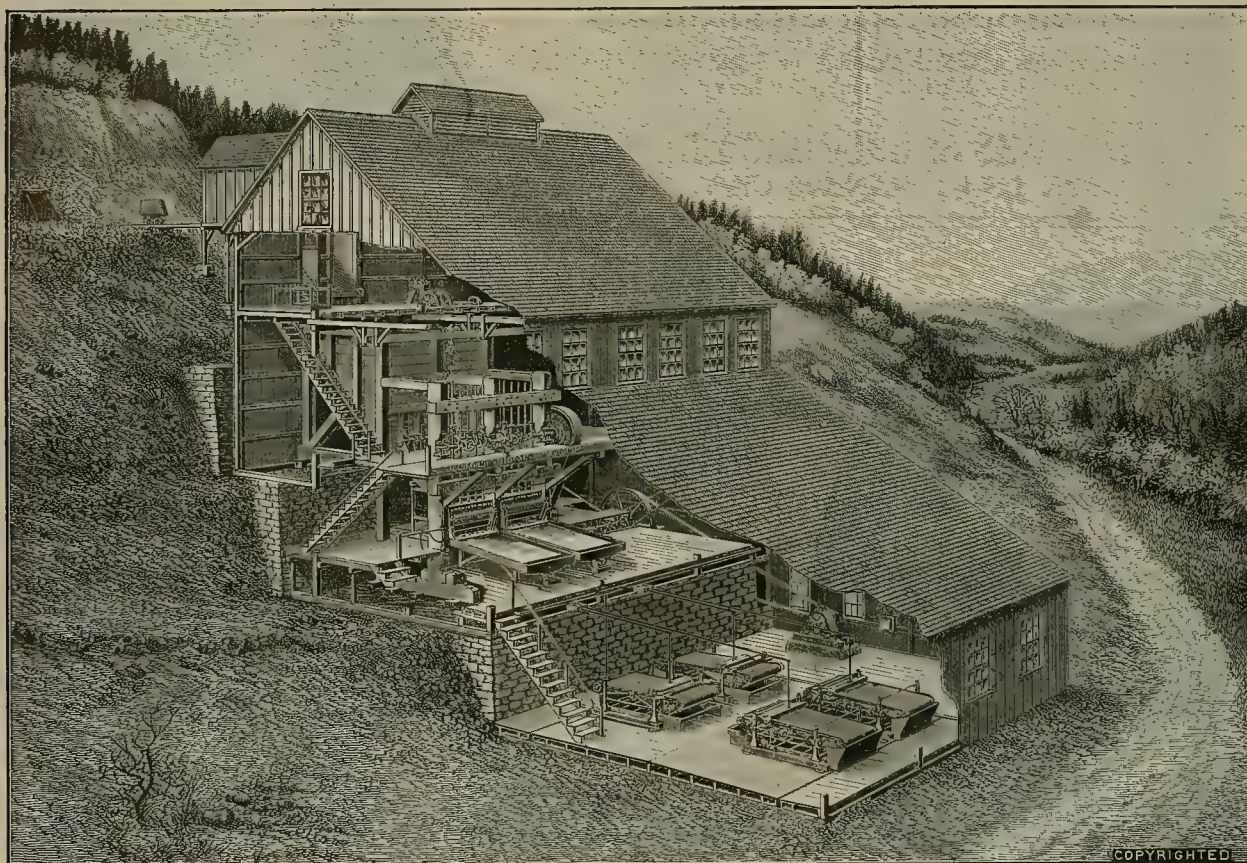
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## The Head of a Mining Ditch.

The illustration on this page shows the head flume of the old Amador canal where it takes the water out of one of the branches of the Mokelumne river in Amador Co., Cal. The Amador canal is one of the comparatively few of the old California mountain ditches originally built for placer mining which have survived the closing down of the hydraulic mines. Nevada, Placer, Sierra, Butte and Plumas counties particularly have hundreds of miles of abandoned ditches and broken-down flumes—disappearing monuments of one of the most unique and intense mining activities that the modern world has known.

Most of these old hydraulic construction works in the localities where most evidence to the eye—the region of the mines—were ditches excavated on high mountain slopes, close to the summits, or on top of the broad, flat summits themselves. There was little attempt at fancy construction, just sufficient work being done to get the service. Wherever practicable, the water itself was made to cut its own channel. The flume constructions were generally most prominent at the heads of the lines, at the bottoms of the mountain canyons. Here there is no earth or easily excavated rock, and the slopes are so precipitous that it is difficult even to find footing for the flumes. In some places these have been built on iron brackets set into the face of vertical cliffs. There has been at least one instance in which they were suspended by ropes. There is an occasional instance of a half tunnel being blasted out of a rocky face to make a flume footing.

The condition depicted in the illustration is not uncommon—the canyon at the head, where the water is taken into the flume boxes, so narrow that there was not space for the water flow in the stream and the line of boxes. In this instance this particular difficulty is partly got around by making the head boxes much smaller than the main line and giving them considerably more grade. The loss of grade was of no consequence. The saving of flume construction made by it more than compensated. The small boxes carried a small cross section of water at high velocity, the quantity of flow being sufficient to fill a large ditch when the canyon widened out.

## A Light Steam Hoist Mine Rig.

A mine is very seldom found so ready made that from the beginning the appliances and equipment generally can be planned and installed for the maximum operation of the mine for a term of years. The mine, as a rule, has to grow. It is a discovery first—a piece of quartz with a speck or two of gold, or a piece of rock which shows well-known metal-bearing minerals of commercial value. The prospector then, with this discovery of a trace, in place or as float, locates the ledge or deposit and proceeds, by stripping of the surface



Head of Amador Canal, South Fork of Tuolumne River, Cal.



Steam Hoist Rig, Petticoat Mine, Near Railroad Flat, Cal.

and the sinking of shallow holes, to determine the surface limits of a payable ore body. If it prove sufficient to justify the next step—of determining depth—the prospector runs a tunnel or sinks one or more shafts. For the latter, recourse is had for hoisting, first to a hand windlass, next to a horse-power whim, or, as an alternative, a cheap water-power rig of the type described and illustrated in last week's issue of this journal.

This prospecting work, if the property develops in the direction of becoming a mine, ultimately outgrows its infancy, and the capacity of the several types of hoisting plants employed during this period, and its first steam hoist equipment as a mine is of the simple and comparatively inexpensive type illustrated on this page. This rig is the old installation on the Petticoat mine, near Railroad Flat, in Calaveras county, Cal. The plant has an upright boiler and 15 H. P. single cylinder hoisting engine. This type of plant still has a portable character. It is not a loss if a mistake has been made as to the mine. It can be removed and set up at another mine. It is of moderate capacity only and its effective range of work does not run much above 400 feet in depth. It does very well for small mines or the beginning of large ones, occupying a position in the economy of the industry about midway between the types of plants special and typical of prospecting operations and the great hoisting plants of the large mines into which the small ones grow.



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## Lesson of the Smuggler Mine Fire.

The death last week of twenty-four miners in the Smuggler mine at Telluride, Colo., from the smoke and gases of a fire burning the mine buildings which covered the tunnel mouth, makes the discussion of the prevention of such accidents in future timely. It is by no means the first of its kind, though in this instance the loss of life is noticeably large. About ten years ago three men lost their lives in the old Belmont mine, near Ophir, Cal., through the burning of the hoisting works building over a 300 foot deep shaft. The men were at work in a level distant from the shaft. No one was in the building at the time the fire started, so far as known, from the blacksmith shop. The smoke and gases were drawn down the shaft into the workings. The air pipe becoming heated by the fire at the surface started an up cast draught from the bottom of the mine, taking out the good air of the mine and causing it to be replaced rapidly by the smoke and fire gases. In this mine there was no other escape except through the shaft. Had there been another outlet to the surface it would have become a down cast, supplying pure air to the mine, as well as providing the opening for escape of the men in the mine.

In the Smuggler mine accident there were other outlets which enabled many men warned in time to escape. But the ventilation of the mine would seem to have been so arranged that they acted as an up cast, drawing in the smoke and poisonous gases. While human foresight could not foresee what has happened it should be able to prevent the recurrence of a similar accident.

It may be accepted that the starting of a fire cannot be absolutely insured against. The remedy would then appear to be protection against the dangerous effects of the fire if it does come. For a mine worked through a shaft, a second shaft at a safe distance from the working one is a safe protection. With the mine worked through a tunnel like the Smuggler, other outlets through workings above the tunnel may be cut off by the smoke before, as in this instance, warning can be given. This is particularly liable to happen if there are workings below the tunnel level.

It would seem, however, that a perfect protection can be given by a branch outlet tunnel leaving the main working tunnel at from 50 to 100 feet from the portal and coming into the open clear

of all buildings, or, indeed, anything that can catch fire. The portal of this branch should even be protected by masonry instead of timbering. At the point of branching there should be doors in both outlets, or one door so arranged that it can close either of the ways. With the main way open for regular mine working and the branch way closed, in the emergency of a fire in the tunnel building closing access to it and driving smoke and gases into it, the latter can be shut off by closing the door reached through the branch from the outside. With the clear opening made and the smoke and gas thus shut out of the mine, there can be no danger to the men.

## A Formula for Reservoir Losses by Evaporation.

City water supply problems, where there is dependence in whole or part on reservoir storage from rainfall, are complicated by the necessity of taking evaporation into account. While the elements that enter into the problems are indeterminate, they have generally been reduced to formulas with the notable exception of evaporation.

Evaporation is a function of the reservoir surface, and its rate or depth of water taken per day or month varies with the temperature and degree of saturation of the atmosphere. Records have been kept of evaporation running through a series of years, from which average rates in particular localities for convenient time intervals have been established. Possibly some further work done in this direction may make such averages more reliable by making them less empirical. The reservoir surface is, however, variable, concerning which little examination has been made toward the construction of a formula for evaporation.

In the employment of a reservoir storage for city water supply, more particularly in California where the year is divided into wet and dry seasons, the inflow in the wet season exceeds the sum of the draft of consumption and loss by evaporation; and the water rising, the surface spreads out and increases, and in the dry season the sum of the draft of consumption and loss by evaporation exceeds the inflow of water and the area of reservoir surfaces diminishes. The draft of consumption and rate of evaporation are both at their minimum in winter when the inflow is at its highest.

Let  $r$ ,  $r^2$ ,  $r^3$ , etc., represent the values of the rate of evaporation in decimals of a foot for successive time intervals for which the rates have been obtained by experiment and record.

Let  $s$ ,  $s^2$ ,  $s^3$ , etc., be the mean values in square feet of successive areas of water surface during the corresponding time intervals for which the rates  $r$ ,  $r^2$ ,  $r^3$ , etc., have been determined.

Then the evaporation for a given period of time is the sum of  $r \times s$ , plus  $r^2 \times s^2$ , plus  $r^3 \times s^3$ . With this aggregate for one year, and the total quantity drawn off for city service for the year, the sum of the two becomes the available run-off of the watershed or catchment area for that particular year. This method here suggested would give more accurate data for evaporation and available run-off than any approximate methods.

The practice, so far as the writer is advised, is to aggregate the rate or depth of evaporation for several months of the year, and estimate an approximate mean area for the reservoir surface during the same period. With these, the annual amounts of evaporation are estimated. The results obtained prove less than the fact, as shown by the results of estimation by the method that has been suggested as being more exact. It might be said that the lower and doubtful result, both being approximate, if used as a factor in other estimations concerning water supply, does not result in a prejudicial error. It is true it may not, but, on the other hand, it can become the underlying cause of serious errors that represent large commercial values.

If the determination be made in the first instance for small reservoirs, and catchment areas, that provide within a limited range of extremes the storage necessary to fill the reservoirs every winter or wet season, and if the use of the results be confined to estimations for those particular reservoirs, or ones of similar capacity and other common elements, the error is not material and would not be suspected.

But if the results so obtained from these small

reservoirs are made the basis of the estimation of projects for very much larger reservoirs, where the surplus storage of several years is estimated on to make up deficiencies of storage of another series of years, the error of underestimation by multiplication may become so serious as to affect materially the commercial side of the projected works.

The evaporation, when determined for known water surfaces in such city supply storage reservoirs as are being continually drawn on, has a percentage ratio to the total run-off of the catchment areas, which is smaller as areas of reservoir surface decrease, and larger as they increase. In reservoirs which in capacity very largely exceed the run-off of the average seasons, it is possible to have the surface so large that the percentage of the annual run-off that is wasted in evaporation approximates 100%. In other words, there is a limit of surface area of such a storage reservoir beyond which the net run-off, after deducting evaporation, contributes nothing further. The storage can grow no greater. It does not require argument to sustain the proposition that the dam construction should stop far short of providing a surface area to the storage water that the net run-off could not increase.

In projecting such a storage reservoir, using an underestimate of evaporation, determined as noted above from comparatively small reservoirs, the structure of the dam can readily be given dimensions in excess of what would be commercially justifiable with a correct estimate of evaporation.

THE rich placer strike made near Mormon Island and Folsom, in Sacramento county, Cal., is another illustration of a good mine missed by the old miners. Mormon Island was a big placer mining camp in 1849. In 1869 the writer recalls it as given over to the Chinese, who were reworking the tailing piles of the 1849 miners. Its former brief glory is not even a memory to the present generation, and few of the old miners who worked at Mormon Island are still alive. The new discovery would appear to be a re-discovery of the old channel of the American river at this point. The miners who worked out Mormon Island in the early days knew nothing of channels. Gold was where they found it, and when they did not find it they moved on. Their successors for years have accepted this ancient verdict of condemnation. It has remained for farmers to find the mine the miners missed. The incident of farmers finding mines has been common enough in the last twenty years in California to base expectations for its recurrence. It is hardly probable that this last discovery will prove very extensive. It is likely only a remnant that, missed in the old mining, is found now. But it does not exhaust the possibilities of the vicinity of Folsom that await discovery. In strongly calling attention to them, an investigation has been started that may lead to the opening up to exploitation of a dozen or more new old mines.

THOSE of our readers who do not keep a file of the paper are urged to do so, as in no other way can they better get answers to questions that are constantly coming up. The matter is referred to because weekly are received questions for answers in "Concentrates" that have received recent answer therein, and when the inquirer is referred to that issue the reply often comes "I have lost or mislaid my copy of that date." The possessor of a volume of consecutive issues of this paper has an epitome of the latest and best in mining, metallurgy and mechanics, up-to-date and of greater value than anything found in books. This is not stated as an opinion or meant in any way other than the noting of a fact often expressed by readers everywhere. The value of such a paper is enhanced by the possession of a file of its weekly issues, as one little item in it has often been found to be worth ten times the cost of the paper for the entire year. The paper will be bigger and better than ever in 1902, and now is a good time to begin keeping a file of it, advertisements and all, for reference.

THE railroads running out of Cripple Creek, Colo., have announced a flat rate of \$1 a ton on all ores regardless of value. This is exactly as it should be, a freight rate uniform for all kinds and grades of ores. Other railroads could adopt the policy with advantage both to the miners and to themselves.



## Concentrates.

THE Madison county, Mont., rate of miners' wages is \$3.50 per day.

New copper plates will absorb gold to the amount of one-half pennyweight per ton of ore milled.

It is generally a good plan to file an amended location certificate when applying for a U. S. patent to a lode claim.

THE Russian Ural platinum mines supply 95% of the world's product of that metal, and last year produced 11,989 pounds.

SO FAR AS KNOWN, the only manufacturer of aluminum in the United States is the Pittsburg Reduction Co. of Pittsburg and Niagara Falls, to whom samples of the clay may be sent.

SOME of the noise in a stamp mill can be overcome by covering the tappets with wooden or leather shoes, as it is the impact between the cams and tappets that makes the most of the din.

VISITING and transient mining men can avail themselves of the facilities of this office in the way of current mining literature, etc. Mail matter may also be forwarded in care of this office.

THE amount of water used in the sluice should be four times the amount of gravel washed. If 10,000 cubic yards are run through per day, the daily requirement of water is about 900 miner's inches.

TURQUOISE gets its fine light blue color from alumina, not copper. Its composition is alumina, 46.9%; water, 20.5%; phosphoric acid, 32.6%. It is two and a half times heavier than equal bulk of water.

THERE is no advantage in mixing black powder and dynamite or "giant powder" in a blast. They can not be well or economically used together in that way, as black powder needs tight tamping and dynamite does not.

BALL MILLS are deemed of value in dry crushing of gold ores, where the pulp is to be treated by leaching processes, where concentration is the chief method of beneficiation, or where the sliming of tellurides is to be avoided.

MINE TUNNELS in which it is proposed to use electric haulage should have a clear height well over the head of a man walking, so that he is in no danger of making a contact with a trolley wire and receiving the electric current.

WHERE a miner is in any danger of becoming leaded, an occasional mouthful of water, to each pint of which has been added two drops of chemically pure sulphuric acid, will help to neutralize the bad effects of the lead fumes or vapors.

IN Mercur district, Utah, the consumption of cyanide averages  $\frac{1}{2}$  pound per ton of ore treated, and the consumption of zinc  $\frac{1}{2}$  pound per ton, being about 2.2 pounds of zinc to each ounce of gold recovered. The cost of milling is about 50 cents a ton.

AN expansion engine is any engine in which the steam at full pressure does not follow the piston for the whole stroke, but is cut off at some specified point, allowing the steam to drive the piston to the end of the stroke under a decreasing pressure.

THERE is no loss of State or Federal legal rights by failure or neglect to record an affidavit of annual assessment work; but such filing may save considerable trouble and expense later on. Increase in value of a mine or prospect always invites litigation.

THE purchase or sale of a mine in California requires the consent of two-thirds of the issued capital stock. This can be given by resolution in a stockholders' meeting, or a written consent signed by the stockholders can be attached to the instrument of conveyance.

THE Wetherill magnetic separator is a device for separating and purifying such ores as are attracted by an electro-magnet. It is built on correct scientific principles and is worthy of favorable consideration. It has a good record for commercial success in practical work.

AFTER \$500 work or improvements, whether in five months or five years, has been put on a mining claim, it is patentable. The whole cost of subsequent securing of a patent should not exceed \$250. The fees should be reduced to one-half what they are now, as a matter of justice.

THERE is no "inspector of mines" in California, nor is it likely there will be soon. The California State Mining Bureau has several men examining and reporting on various mining developments in different parts of the State, but inspection or supervision of any kind is not among their functions.

CUPELLATION is an ancient metallurgical process, having been well known 2500 years ago. Recent discoveries at Silchester, England, also show where a silver refinery was operated there by the Romans, argentiferous copper being cupeled on hearths made of boneash in the era about 300 A. D.

THE California State Courts have ruled that stock companies must issue new certificates to stockholders who can prove that they have lost their certificates. The judgment of the Court ordering the issue is held to protect the corporation against the reappearance of the lost certificate.

THE only occurrence in the United States of phosgene that is known to "Concentrates" is in the Terrible

mine, Iise, Custer county, Colo. It is a chloro-carbonate of lead, consisting of carbon dioxide, 8.1; chlorine, 13; lead oxide, 70.9. It occurs in the locality mentioned in cleavable masses associated with cerussite.

TUNNEL DRIVING through soft rocks, such as marls, shales and sandstones, is now being considered by engineers as possible of accomplishment by specially devised electrically driven drills, which will, in one cutting, make the entire heading, 8 or 9 feet in diameter, and do more rapid work than at present accomplished by the use of explosives.

QUARTZ VEINS frequently have different angles of dip at different depths. A solid vein at the surface is often found scattered in stringers beneath, and the reverse is noted. It is a good plan to drift on a bunch of seams cut by a tunnel about where the ledge ought to be. The seams may be found to close in and becoming solid identify the ledge.

TWO CYANIDE PROCESSES are in use in the Black Hills. In one, the "wet" process, the ore is crushed in the ordinary stamp mill battery in the cyanide stock solution; in the "dry" process the ore passes from the crusher through the rolls and in a dry state is immersed in the cyanide solution. From 80% to 92% of the value of the ore is extracted.

CEMENTED GRAVEL carrying gold, in which the cementing material is a tough, hard clay, is best broken up and washed in a pan. The gravel stones, as they become free, assist in the working of the clay into suspension in the water. Any clay left in sticky masses is sure to carry off gold. Once the gold is free and settled beneath the sand and gravel, it can be saved without special difficulty.

A BALL dropped from any considerable height will strike the earth to the east of the vertical line in which it started. As it drops, it maintains the velocity of motion toward the east which the point had from which it started. As it approaches the earth, it comes to a point which has a slower velocity than the starting point, and will, therefore, be moving to the east faster than is the place it strikes.

TUNNEL WORK may count as annual assessment work, even though the mouth of the tunnel and much of its course is not on the claim; but it must "head" for the vein on the claim to which it is intended such work shall apply. If so, and written consent is obtained from the owners to pass through other claims between the tunnel entrance and the claim headed for, there should be no difficulty.

THE only way in which an electric appliance can benefit the body electrically is by producing electrical energy capable of doing work upon the body. There must be a source of energy in the appliance, and that source requires to be renewed from time to time, as the energy produced by it becomes exhausted. Any electric appliance, therefore, which professes never to need electrical renewal is a fraud.

MOLYBDENITE is the ore from which molybdenum is produced. It is not used on the Pacific coast. Concentrated, it is worth, delivered, \$200 per ton. It is found in El Dorado, Fresno, Inyo, Nevada, San Diego, Kings and Tulare counties, Cal. It is a soft, metallic, scaly, foliated mineral, of glossy lead color, and is the sulphide of molybdenum. The Bethlehem Steel Co., Bethlehem, Pa., can answer any question about its commercial use or value.

SUPERHEATED STEAM is obtained by the addition of heat to saturated steam. In behavior it resembles fixed gases. It is a bad conductor of heat and has the special peculiarity of being able to lose a certain amount of heat without becoming saturated steam again. Very little heat is required to superheat steam, but as it loses heat as rapidly and easily as it gains it, all the pipes carrying superheated steam must be well protected with some non-conducting covering.

THE engineers of the Southern Pacific R. R., surveying for a tunnel through the summit of the Sierra Nevada mountains, have found impracticable the proposed route tunneling through from Donner lake, Cal., on the Truckee side into Soda Springs valley, on the North Fork of the American river, on the Sacramento side. The difficulty was with construction below Soda Springs valley toward Emigrant Gap, Cal. They are now surveying a route from Donner lake under Summit pass into the canyon of the South Yuba river, Cal.

THERE are many good reasons for adopting the metric system. As a business proposition, it would pay. It might be a little confusing for a while, but so is any new thing, however good. A meter is 39 inches; it is as easy to think of an inch being one thirty-ninth of a meter as to think of its being one-twelfth of a foot. It is no harder to think of a 39-inch standard than of a 36-inch one. The system is based on the decimal system, as is our United States currency. The calculations and work of the world will be carried on in decimals sooner or later.

CYANIDE is a compound of cyanogen with a metallic agent. Cyanogen is a colorless, poisonous, liquefiable gas which has the odor of almonds and burns with a purple flame. Cyanide of potassium is made by burning potassium, an alkali metal, in cyanogen gas, and is really a prussiate of potash. It is produced also in blast furnaces in which ore is smelted, with coke or coal, and is prominent when kept dry, but decomposes rapidly in moist air. It crystallizes in dry, octagonal blocks, and is ex-

tremely soluble in water. It has the odor of prussic acid and kindred bitterness of taste. Besides its interest to miners and metallurgists in the cyanide process, cyanide of potassium is also used in electro-metallurgy and photography to a considerable extent. It will remove metallic oxides, the juices of fruits and indelible ink.

IN a belt-driven electric generating and transmission plant in which the prime mover power is steam, the losses will aggregate on an average about 40% of the theoretical steam power, leaving about 60% recoverable in work from a motor. In a water power direct-driven plant, with the electric generator on the water wheel shaft, the losses aggregate just about the same. The steam engine, on the average, can be made to produce a higher percentage of efficiency than the water wheel, the gain offsetting the loss of the belt transmission. These figures refer to average good practice.

IF one person goes upon the mineral lands of the United States and either establishes a settlement or works thereon without complying with the mining laws, and relies exclusively upon his possession or work, and a second individual locates peaceably a mining claim covering a portion of the same ground, and in all respects complies with the requirements of the mining laws, then such second party is entitled to the possession of such mineral ground to the extent of his location as against the prior occupant, who is from the time said second party has perfected his location and complied with the law a trespasser.

THE fault with the silvered plates may be imperfect amalgamation at the start. A good way is to scour them with a mixture of wood ashes and fine sand, such as had passed through a No. 80 screen. After cleaning the plates with water, mercury should then be rubbed in with a mixture of sal-ammoniac and wood ashes, the plates then left with this mixture on them for twelve hours. At the end of that time silver amalgam will be seen in little patches all over the plates. This is to be rubbed in with a little more mercury, which concludes the operation. Thus treated, silvered plates should work well and last a year. For some months they may require little attention beyond sprinkling a little mercury over them after the daily clean-up and rubbing it well in. Subsequently a daily wash with a solution of sal-ammoniac has been found beneficial.

TO USE a large quantity of water under a very high head for power development, if a single line of pipe be projected, requires a large diameter and a very great thickness of metal. This means a very high cost. As an alternative to the single line, the common practice is to use two, three or four lines of pipe of lesser diameter. A considerable economy of metal and cost is effected. There is still a third scheme that can be considered particularly when the power pipe line is of considerable length. This consists of dividing the head into two or more sections with a corresponding number of power stations. The single pipe line is cut into sections. A very considerable economy can be made of metal and cost. The offset to this is the cost of the one or more added power station buildings and the wages of added employees. There is no difference in the machinery installation except its division into two or three parts.

THE most commendable system is to follow, as closely as possible, the ore in sight, and if the ore gives out, and the showings, all things considered, seem to justify further exploration, the work should be confined as nearly as possible to the proximity of the point where the ore body was disclosed and extracted. This increases the probabilities of finding other ore bodies and curtails much unnecessary dead work incident to conducting other exploratory work. In the early stages of exploration the inclined shaft, following the dip of the vein, is usually the best plan to adopt, as it affords opportunities to examine the ground being developed and also because it is generally cheaper to sink such shafts than vertical shafts outside of the vein formation. This, however, is not invariably the case, as the country rock is sometimes softer than the vein matter and sometimes when the vein is wide, the filling is broken and difficult to sink in. Water in the vein is also sometimes a drawback, but, as prospect work, to follow the vein if possible is the most commendable. When it has been satisfactorily determined that the vein and the ore shoot being opened carry well in depth and the topographical features are such that the mine cannot be economically opened by tunnels, then the vertical shaft, with crosscut drifts to the vein, affords the safest and best plan for extensive operation and the introduction of cages and other appliances that tend to facilitate mining and which cannot be as successfully employed in an inclined shaft. The latter shaft should be sunk from 250 to 500 feet on the vein to demonstrate the features of the vein and levels should be run to determine the extent and value of the ore bodies in the shoots before undertaking to sink a vertical shaft. Sometimes a mining claim, being the extension of a developed mine, bears considerable prospective value, from the fact that the ore shoot, opened in the developed property, bears, or trends toward this claim. If this is the case, and the shoot is tenacious and of considerable magnitude and value, it is a safe undertaking to sink a vertical shaft on this claim to intersect the shoot at the most favorable point the trend and dip indicate. Such undertakings have in many instances resulted in opening valuable mines which were devoid of favorable surface showings. Generally the character of exploratory work should be determined by the locality of the ore body to be prospected, and by local topographical features.



## Late Gold Dredging Practice.\*

NUMBER V.

Written for the MINING AND SCIENTIFIC PRESS  
by RALPH L. MONTAGU.

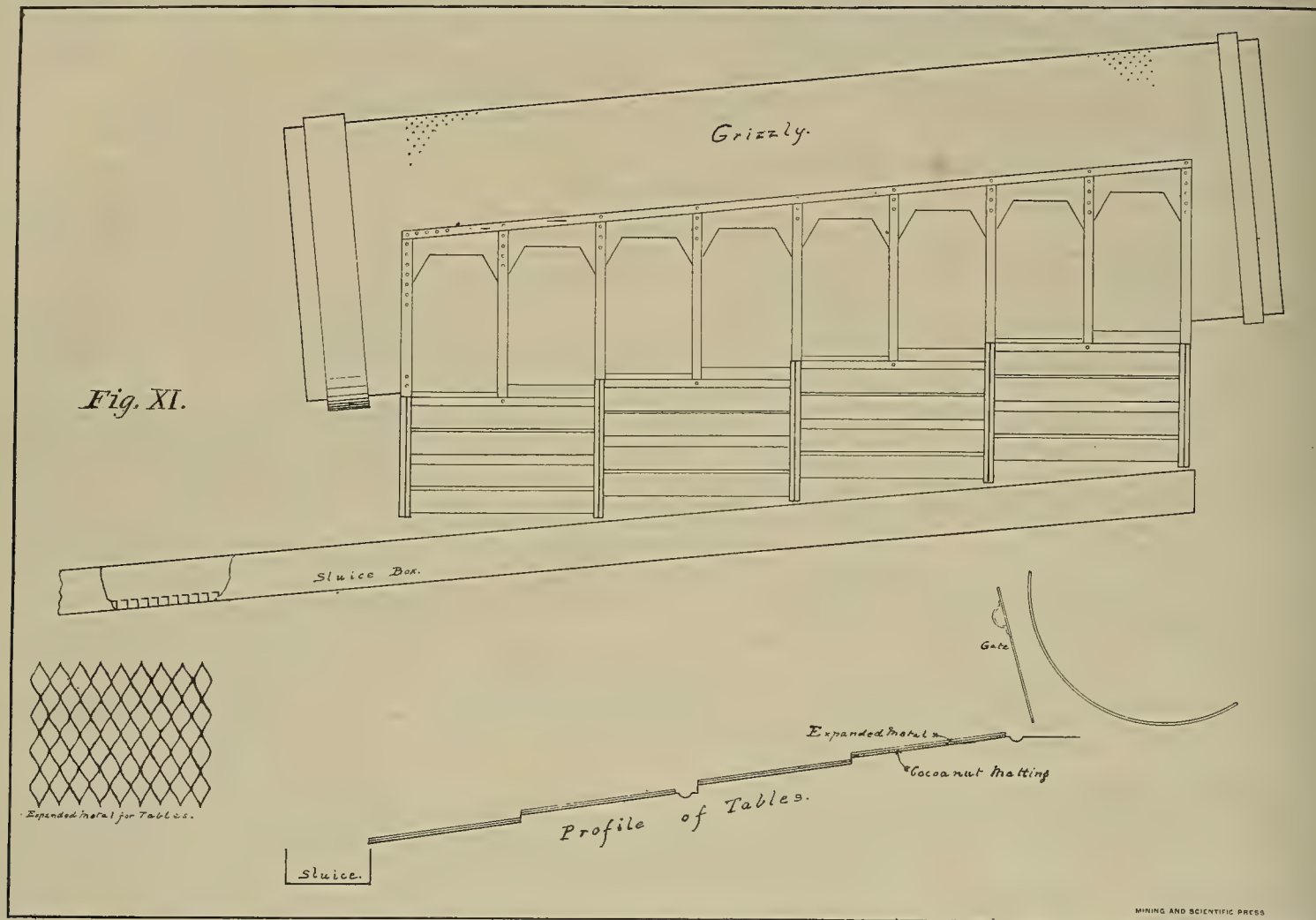
On these dredgers (Fig. 5) the gravel is screened very fine and is run over tables (Fig. 11), where

and run through the sluice box in the ordinary manner. It will be found that the black sand settles first in ridges between the edges of the plates, and finally the entire sluice box will be 1 or 2 inches deep with black sand carrying the gold. The ordinary river sands, having no iron in them, are not caught by the plates.

When it is necessary to clean up, a box can be

and better way is to have a box of say 15 cubic feet made. If this box is made of wood, it should be caulked perfectly tight. Swing this under the dumping end of the sluice box, and when it is nearly filled with gravel remove it.

Drain the water off and carefully measure the gravel contained and pan down. Presuming a value of 1 cent per cubic yard is got, to this must be added



cocoanut matting is overlaid by a network of expanded metal. From the tables the material is carried by small sluice boxes to the sand pump. The riffles in these sluice boxes are made of angle iron, as shown.

In some localities the gold is so extremely fine that it is impossible to separate it from the black sand. A loss of considerable magnitude will be experienced if any of the preceding methods of saving gold are tried in this case.

I have designed a special sluice box for this purpose, which collects all the black sand and incidentally the gold, without collecting any of the other sands. There are no riffles in the sluice box, but into the bottom plates of soft iron are let in (Fig. 12).

placed at the lower end of the sluice, the magnetizing current is cut off and the black sand, etc., is swept down into the box. It can then be sacked and shipped to smelters.

It is a good idea, where this method is used, to have two or three special sluices side by side, with a gate arrangement at the upper end, so that the water and fine gravel can be cut off from one sluice for the short time necessary to empty it of black sand. Practice will show how often it is necessary to empty the sluices in order to get the best results.

Most dredgers use electric lights and the dynamo which supplies these can be increased in capacity so as to furnish current for the magnet; or, where alternating current is supplied to operate the

the percentage of boulders in the gravel which do not pass through the sluice box. Supposing this to be about 10%, we are losing 1 cent per 1.11 cubic yard, which is .9009 of a cent per cubic yard. A number of tests should be taken and an average obtained from them for the figures to be of any value.

The amount of material handled by the dredger should be carefully measured; the value of the gold saved and that lost per cubic yard should be compared with the prospected value of the ground; the difference is the gold that is left on bedrock. It has already been stated that a dredger will not clean a hard, rough bedrock cut up by deep crevices.

**THE ELECTRICAL EQUIPMENT OF A DREDGER.**—Throughout a large area of the mining districts good fuel is quite expensive, but frequently this condition is met by an undeveloped water power or a local system of electric power transmission.

There are two distinct systems of electrical energy that are used for transmitting power, the direct and the alternating current systems. Where the distance from the source of the power to its delivery is less than 3 miles direct current should be used, but above that distance the alternating current is more economical.

In a direct current system the current is supposed to flow through the wires forming the circuit in the same direction continuously, i. e., at the positive (+) terminal and returns at the negative (−) terminal.

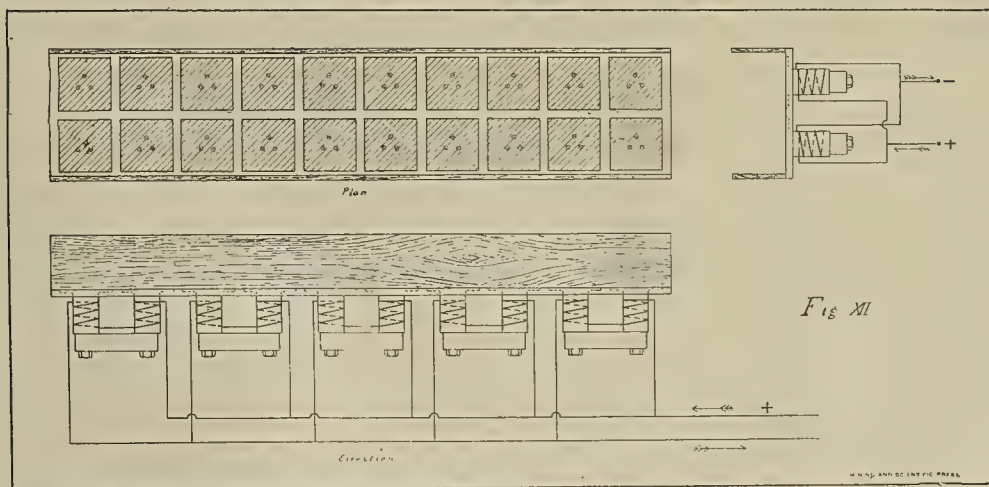
The current in the alternating system flows alternately back and forth, i. e., the current starts from one terminal, being received back at the other and then reverses.

One complete forward and backward flow is called a cycle; an alternating current is described as being of sixty cycles. This means that there are sixty complete cycles per second. Sometimes the same current is styled 7200 alternations. This means that there are 7200 alternations of current per minute.

The units used in measuring electrical energy are the volt, which is the unit of pressure or potential difference, and the ampere, which is the unit of the amount or intensity of flow of current.

The product of these two factors (amperes and volts) is known as watts. A watt is the unit of power (746 watts = 1 H. P.).

To those who are acquainted with hydraulics an analogy can be drawn between the volt and the pressure per square inch, and the ampere and the cubic feet of water per minute. A flow of water of 1000



These plates are flush with the bottom of the sluice box. Attached to these plates on their under sides are electro-magnets. These magnets should be made of soft iron, so that when the magnetizing current is cut off they quickly lose their magnetism.

The polarity of these plates is so arranged that the north pole is surrounded by south poles, and vice versa. The gravel must be screened very fine

dredger, this current can be changed to a direct current by a rotary converter.

The amount of sand that can be collected in one of these special sluices is in proportion to the strength of the magnetizing current, up to a point known as the saturation point. Beyond this the further increase of magnetizing current weakens the magnet.

When the tailings are tested to find out the percentage of gold not recovered, it is not much good to scratch on the surface and pan the dirt. An easier



cubic feet per minute at a pressure of ten pounds per square inch would produce the same power as a flow of 100 cubic feet per minute at a pressure of 100 pounds per square inch. Likewise a current of 1000 amperes at 100 volts pressure would represent the same power as a current of 100 amperes at 1000 volts pressure. In the hydraulic case the pipe to carry the water in first case would have to be considerably larger than in the second case, but the strength would not need to be as great as in the second case, where a greater pressure had to be withstood.

In the electric problem the wire would be, in the first case, ten times the cross section of that used in the second case, but the covering (insulation) in the second case would have to be better able to withstand the higher strain of the increased voltage. From this it will be seen that in order to transmit power a distance by electricity economically, the current strength (amperes) should be small and the pressure (volts) great.

In order to deliver 100 H. P. at a point 5 miles distant through the medium of direct current, 550 volts pressure, the copper in the line would weigh 67,457 pounds, the efficiency would be 90%. With alternating current 5000 volts the same power could be delivered at an increased efficiency, i. e., 94% over a line the copper of which would weigh only 3945 pounds.

The direct current does not lend itself to transformation, and owing to facts that it is not necessary to enter into here, it is not practical to build a direct current generator of higher pressure than 1000 volts. (The commercial standard is 550).

On the other hand, alternating currents can be readily transformed from currents of large amount at low pressure to currents of small amount and high pressure, and vice versa.

A transformer, which is used for this purpose, consists of a magnet with two coils of wire wound on it. These coils, which are not electrically connected with each other, are known as the primary and the secondary coils. In a case where it is necessary to convert a large amount low pressure current into a small amount high pressure current, the primary coil would consist of a few turns of a wire of large cross-section; the secondary coil would, on the other hand, consist of a coil with a great number of turns of wire of small cross-section.

This is called a step-up transformer; a step-down transformer, which reduces the high voltage to a lower and practical level for the operation of motors, is located at the other end of the line. Transformers require little or no attention, as there are no moving parts; the principal cause of depreciation, which is slight, is the general weakening of the insulation which separate the wires from one another. The following table shows approximately the difference in cost of a direct and an alternating current transmission system to deliver 1 H. P. at a point 5 miles distant from the source of power:

| Dynamo transformers.       | Copper in line.  | Total.           |
|----------------------------|------------------|------------------|
| Direct.....\$14 04 @ H. P. | \$134 91 @ H. P. | \$148 96 @ H. P. |
| Alternating 32 04 @ H. P.  | 7 89 @ H. P.     | 39 93 @ H. P.    |

In equipping a dredger with electric motors considerable attention must be paid to the class of work done by the machinery that is driven by each individual motor. It is not good engineering to have one large motor, which through a system of belting, gearing and countershafts drives several different pieces of machinery, although this is done on a number of dredgers.

Where direct current is used there are two distinct types of motor, viz., the shunt wound motor and the series wound motor.

The shunt motor is wound with two distinct circuits. A fine winding of a great number of turns is used on the magnets, the terminals of which are connected directly to the mains, and a heavier winding is placed on the armature in series with which is an external starting resistance or rheostat. (Fig. 13).

on the magnets and then through the armature winding. (Fig. 14).

The shunt motor is capable of maintaining a practically constant speed irrespective of the variations of load; the following test showed a constancy of speed to within 1 1/2% for all loads within the working limits of a small motor.

| H. P. at brake. | Rev. per min. | Torque.<br>(Pounds-feet). |
|-----------------|---------------|---------------------------|
| 1.1 .....       | 1,125         | 5.15                      |
| 7.4 .....       | 1,120         | 33.4                      |
| 10.36 .....     | 1,115         | 48.8                      |
| 11.14 .....     | 1,110         | 53.0                      |

For driving such machinery as revolving grizzlies, shaking screens, centrifugal pumps, stackers or belt conveyors, where the load is steady and a constant speed is desired, a shunt motor should be used.

In starting a shunt wound motor the switch is closed and by the motion of a movable arm the external armature resistance is generally cut out of the circuit. This armature resistance prevents a sudden rush of current through the motor. A parallel may be drawn between the action of cutting out resistance and the gradual opening of the valve of a steam engine.

For driving the bucket chain and the winch where a variable speed is desired, and where, as in the case of a bucket chain, a powerful starting torque is necessary, the series motors are installed. The speed of a series wound motor is in proportion to the work it does. A further variation can be obtained in the speed of the motor by introducing resistance into the circuit. The series wound motors are started, stopped, reversed and their speed is varied by means of a device called a controller, similar to those which are in use on electric street cars. It is, unfortunately, practically impossible to obtain the same variations of speed with a motor as can be done with a steam engine; therefore when very great differences of speed are required, as are called for by the winch, although a motor can be made to give two or more distinct full speeds, it is better to introduce a differential gearing which will accomplish this object.

I am in favor of having the motor that drives the winch geared directly to it, instead of using a belt, which has been known to come off at a critical time.

Motors should also be installed which have a margin of load over and above the work they have to do; I have found by practice that 20% is sufficient; i. e., a motor that would have to produce 100 H. P. should have a full-load rating of 120 H. P. This adds to the first cost, but there is then no danger of the motor being destroyed by temporary overload, and the life of the machine is considerably lengthened.

An ammeter, a machine which measures the intensity of the current, should be placed on each motor circuit. It is a very poor policy to save a few dollars and dispense with these instruments, as is done in a number of cases. A volt meter should also be connected across the mains; this instrument shows the difference of potential between the mains.

Safety devices which consist of lightning arresters, fuse blocks or circuit breakers should never be omitted. A lightning arrester is a device in which there are two metal or carbon points separated from one another by a small air gap. One of these points is connected to one of the wires and another to the ground. When lightning strikes the overhead pole line instead of going to the motors and destroying them, it jumps across the narrow air gap onto the metal point connected to the ground, and does not cause any damage.

A fuse block consists of introducing into the circuit a short length of an easily fused alloy; when through any cause a heavy rush of current (sufficient to destroy the motor) takes place, the alloy melts and opens the circuit and cuts off the electric current.

A circuit breaker accomplishes the same thing but by a different method. In this device the wire carrying the current is wound round an electro-magnet

rent strength reaches a certain point the attractive force of the magnet overcomes the spring and, drawing the armature to it, releases a catch that allows a spring switch to open the circuit.

Circuit breakers are used on direct current systems for breaking heavy currents. For an incandescent or arc light circuit fuse blocks are sufficient. Fuse blocks are used almost entirely on alternating current systems. The Westinghouse Electric Co. manufacture a fuse block in which the fuse is completely enclosed in a lignum vitae case. When the fuse burns out all danger of fire is thus removed.

(TO BE CONTINUED)

## Mountain Roads.\*

By JAMES W. ABBOTT.

INTRODUCTION.—It may be stated as a general proposition that practically every mountain road west of the Missouri river has been built to meet a need arising in some way from the existence of mineral deposits. The prospector, with his crude tools, blankets and simple food packed upon his faithful burro, goes ahead. In his business neither roads nor trails are necessary or specially desirable. He finds the mineral, the news gets abroad, and others flock in to try their luck in the newly explored region. Then comes the trader with supplies, men to buy, and miners to work the new finds. The freighter with his mule team furnishes transportation, and for his use are built the first mountain roads. The motto is, "Get there and get there quickly." The first desideratum seems to be a route over which vehicles on four wheels can travel without tipping over. It is often so steep in places that wagons can only be pulled up with blocks and tackle, and descend with wheels rough locked and dragging a heavy log behind.

Next come roads to particular mines, toll roads, county and State roads, each case usually affording ample latitude and scope to the actual ignorance or bad judgment of men of all grades of supposed road cunning. There is not a mining county or a mountain county (the terms may be considered synonymous) from the eastern base of the Rocky mountains to the Pacific coast where the money squandered in traveling over bad roads would not in five years build new ones intelligently located and properly constructed.

But the saving to existing enterprises would be only a small part of the advantage to accrue to any region from such a betterment of its road system. The expansion of the mining industry everywhere is due principally to the development of ore bodies of low grade but abundant quantity, where processes involving the strictest economy and most careful saving at every step yield in the aggregate a slight margin of profit. Hundreds of thousands of tons of ore are mined and treated where this margin is less than \$1 a ton. The saving of a few cents a ton on ore down to the mills and a corresponding saving in freight charges on fuel, provisions and other supplies up to the mines means in the freight item alone a very considerable percentage on a large capital to companies producing hundreds of tons a day.

Throughout this great region thousands of deposits now lie idle which, with roads properly constructed, will become available, furnishing a new, vast market for labor, mining machinery and farm products, and benefiting directly or indirectly every industrial and financial enterprise in the United States.

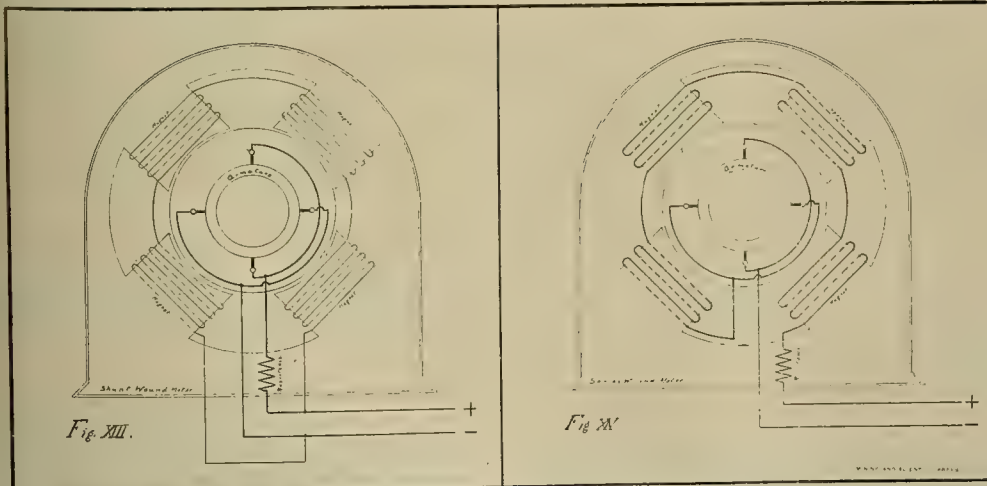
But mountain roads must not be considered alone from industrial or utilitarian standpoints. The inspiring, health-giving effects of mountain air and mountain scenery are universally conceded. For those living in them, and for those who come to them for business, pleasure or health, the need for roads which can be traveled in safety and comfort is just as imperative as it is elsewhere. In all the older settled regions of the country the sentiment which demands good roads is increasing with marvelous rapidity. This should not and will not halt at the foot of the mountains.

The conclusions as to practice presented in this paper, formed by the writer during twenty-five years largely spent in building and operating mountain roads, have been modified or confirmed by much conference with men of large experience and well-digested views on the subject. They are offered in the modest hope that in the criticism which may be elicited, the records of experience which may be presented by others, and the careful study of the subject which is now going on, better methods in mountain road building will result.

The suggestions are intended to meet the conditions existing in Western mountain counties, where population and means are usually quite limited. They relate to a standard for road building which, while not elaborate or expensive, is certainly attainable and would be far in advance of prevailing average practice.

GRADE, THE KEY TO CORRECT METHODS.—The key to all correct methods of mountain road building is grade. It is generally expressed by percentage. A 1% grade means a rise of 1 foot for each 100 feet of horizontal distance traveled. There are 5280 feet in

\* From Year Book U. S. Department of Agriculture for 1900.



In a series wound motor the current goes through a variable resistance, then through a heavy winding

which attracts an armature towards it; a tension springs holds this armature back, but when the cur-



a mile. Hence a 1% grade means a rise of 52.8 feet in that distance, a 2% grade a rise of 105.6 feet, and a 10% grade a rise of 528 feet.

The proper grade in each case must be determined by the conditions and requirements. For bicycle travel a 2% grade can be ascended with comparative ease and descended with little effort. Heavier grades, up to 5%, are practicable for this purpose when unavoidable. They can be ascended by the average bicycle rider without extremely arduous effort and descended without serious danger. Grades above 5% are too steep for ascent with comfort or descent with assured safety.

For pleasure driving the grade, where practicable, should not exceed 4%. A good horse with a light buggy and two persons will trot easily up a 4% grade and as easily down without a brake. With a higher gradient the strain in either direction becomes increasingly apparent.

For freight traffic the maximum grade admissible is 12%. Four animals, together with the one or two wagons used on a mountain road, are all that one driver can safely and properly handle on steep grades. When he uses two wagons, lead and trail, at every stop ascending he must hold both wagons by the brakes on the lead. In descending with heavy loads, excepting when the roads are icy, he must control his wagons with brakes on both—the lead by the lever beside his seat, the trail by a strap leading to the brake lever. When the road is icy he must control the descent by rough locking one or more of his rear wheels. To rough lock, he attaches some rough device, like a piece of chain, or a short steel runner, grooved on the upper side to fit the tire and with projecting prongs on the lower, to the felly of a rear wheel, just in front of the point where it rests upon the ground. A chain attached firmly to the center of the forward axle is then tightly fastened to this rough lock. Thus secured, as the wagon descends the hill the wheel remains rigid and the rough lock plows into the surface of the road.

Experience in heavy freighting has shown that wagons can be actually and satisfactorily controlled in all weathers on 12% grades, but that they can not be thus controlled on steeper grades, and that where heavy freighting has been attempted on steeper grades it has almost invariably been attended with terrible accidents. In freighting on any grade the weight and number of wagons will depend upon the proportion between material to be hauled up and freight back. On a properly constructed dry road four animals, averaging 1300 pounds each in weight, will haul 6500 pounds, total weight, distributed between wagons and contents, up a 12% grade at the rate of about 1½ miles per hour. Descending, the four animals will haul all that a wagon can hold up, but in practice this amount rarely exceeds 16,000 pounds on a single wagon, or 20,000 pounds on a lead and trail, and the average is probably not much in excess of 10,000 pounds on one wagon, or 14,000 pounds on lead and trail. When roads are icy heavy wagons tear up a roadbed badly.

But while 12% grade is admissible as a maximum, roads of lighter grade are so much more efficient and satisfactory in every way that only the gravest necessity should ever determine the maximum at 12%.

Mountain roads are routes of travel between points of different altitudes. The most common, as well as the most serious, mistake made in their location is the attempt to cover this distance by too short a line. On a 12% grade every pound of freight going up is elevated 12 feet for each 100 feet of horizontal distance traveled. On an 8% grade it is elevated 12 feet in 150 feet of horizontal distance traveled, while on a 6% grade it is elevated the same amount in 200 feet of horizontal distance. Or, in other words, the distance required to get a 12% grade must be increased one-half for an 8% grade and doubled for a 6% grade. Tables have been published giving the comparative weights which a horse can pull on different gradients; but, so far as the writer knows, no actual statistics have ever been compiled which show what would be the difference in performance in actual freighting between good roads of different gradients. The limit of load which a team can pull on any road is determined by the steepest place in that road. It is rare that a mountain road is built on which the maximum gradient is less than 12%. It is also true that there are very few places where mountain roads have been constructed that it was not feasible to secure a maximum under 12%. The extra length that would be required is generally much less than one would at first suppose. Roads built on a continuous uniform grade are very rare. Many seem to go up steep places just for the sake of going down again, thus giving a grade adverse to the heaviest traffic, which ought never to be compelled to climb a foot in descending a mountain. So far as the writer's study and observation have extended, 99% of all the roads built for heavy mountain traffic might have had a maximum under 12%. It is putting it very moderately to say that a team will haul up 50% more load in the same time between two given points on a road with an 8% maximum than it could haul on one of similar surface with a 12% maximum.

Besides the advantage in upfreighting, the 8% road possesses many favorable points which are liable to

be lost sight of. It is vastly safer for both light driving and freighting; on passenger vehicles brakes, while desirable, are not essential to safety; with heavy loads, if the brake fails there is a fair chance of escape for driver, team and wagon. Such a road is not seriously damaged by rain and melting snows, which work such injury on steeper grades; damage from rough locking is enormously reduced, and as such practice can be to a great extent avoided the time thus consumed is saved. Repair bills on wagons and harness are lessened, and the life of wagons is greatly prolonged. It is a pleasure to drive down an 8% grade, as it produces a sense of exhilaration which most people find agreeable. As gradients become steeper the sense of danger grows more and more keen. The writer believes that 8% is the gradient to be aimed at where important differences in elevation are to be overcome, and that such gradient can generally be secured. As a rule, in such cases a lower gradient means too long a route without commensurate advantage, while a higher means an unnecessary loss in the very purpose for which the road is required. The maximum adopted in the old Government pike crossing the Alleghanies was 7%.

**IMPORTANCE OF LOCATION.**—Next in importance to grade is location. The worst obstacle encountered on mountain roads is snow. The snowslide, or avalanche, comes sweeping down the mountain side, carrying along everything it meets and depositing its accumulations when the momentum is exhausted. The customary routes of these slides are generally quite apparent to the practiced eye of the mountaineer. In laying out a mountain road one can sometimes avoid a snowslide track by crossing to the farther side of the gulch. Sometimes it is possible to put the line so high that the snowslide will always stop beneath it. If a snowslide covers a road, it is rarely practicable to clear it for heavy traffic for months. The accumulation of ice, snow, rocks, trees and debris of all kinds is so enormous, and the cost of removing it during the cold, short days of winter so excessive, that a snowslide generally remains where it falls until nature lends the chief aid in its removal. In roads designed for heavy traffic, it is the wisest economy to avoid snowslides at almost any cost.

Next to snowslides in destructive effect are snowdrifts, due to air currents. These act with remarkable uniformity from year to year. The places where these drifts accumulate in excessive amount can generally be located and avoided by careful attention. Deep ravines almost always catch snow. In a snow region it always pays to go around a point by a side-hill grade in preference to cutting through it.

The track of a waterspout must be carefully noted and an ample waterway provided. These result from currents of air due to physical outlines, and generally recur in the same places. They always leave abundant evidence by which their courses may be located.

Always locate roads on slopes facing south and east in preference to slopes facing north and west. These afford the sun greater power to settle and melt the snow.

A sidehill gives a better road than a creek bottom. It is always better drained and generally has a more solid foundation.

The matter of crossing streams should receive the most careful study. Bridges are costly to build and expensive to maintain. The writer recalls a mountain road that originally crossed the same stream sixteen times in the first 2 miles. This number has been reduced from time to time until now only two crossings remain.

Very steep sidehill slopes and hard rock increase the cost of road building. It is often possible by study to avoid them to a greater or less extent. It was a favorite expression with a very successful man that "Nothing pays like first cost in road building," meaning that money expended in intelligent study of a location was the most economical item of all the cost. Most problems in road location that at first seem impossible of practical solution can be solved.

**OBJECT OF DRAINAGE.**—In level regions we drain roads to protect their foundations; in the mountains we drain them principally to protect the surface. Water naturally runs off from a slope, and in doing so it must always leave more or less effect. Every mountain road must run through a valley or along a hillside. If in a valley, the surface should have a crown of at least 6 inches, with gutters and ditches and drains just as in properly constructed roads in a level region. In mountain roads on hillsides, on the other hand, a very different practice must be adopted. The outside of the road must be the highest, with the view of conducting the water as quickly as possible toward the inside bank, where it should find a gutter to carry it to the nearest drain. This prevents the water from spilling over and washing away the outside bank, and also has a tendency to keep it from running down in the ruts and enlarging them. There is a vital reason for keeping the outside of the road on hillside grades higher than the inside. There is always a tendency for the wheels of a heavily loaded wagon to slough toward the lower side. This becomes very serious when the road surface is slippery, and terrible accidents have happened. Rain or melting snow always wears down some of the material from the inside bank. If the road surface

slopes outward, this debris follows the drainage across the road, continually increasing the slope, sometimes very rapidly in cold weather; hence the roadbed, for the protection of both the bed and the traffic, should be constructed and maintained with an inward slope of at least ½ inch to the foot. The inside gutter should empty into drains crossing the roadbed diagonally at suitable intervals, determined by the amount of drainage.

**NECESSITY FOR PROPER BATTER.**—The importance of batter in mountain road building seems to be little understood, and correct practice is almost universally ignored. It is very common to see hillside grades constructed as follows: Insecure cribbing with a vertical face, constituting the outside of the roadbed; the inside bank cut as nearly vertical as possible, and three-quarters of the entire width of the road perhaps built of material filled in, the filling generally including all the trash available (boughs, sticks, boulders, etc.), with a covering of such material as the bank affords; width, in such cases, barely sufficient to hold a wagon when the road is first built. The destructive forces of nature act vigorously on such a roadbed from the start. Ice and water rapidly wear down the inside bank, and the debris falls upon the roadbed. The trash foundation settles and the road sinks, sloping outward. Water finds its way through this loose material and undermines the roadbed, making holes, or invisible death traps. The cribbing settles, rots, and soon disappears altogether. Unless such a road is practically rebuilt in a few years it grows more and more dangerous, and finally becomes absolutely impassable. The above is no fanciful sketch, but an accurate description of practices and conditions to be found almost everywhere in mountain regions.

(TO BE CONTINUED.)

#### Machinery and Wages in the American Steel Trades.

At one time in the United States a roller in a rail mill, rolling iron or steel rails, received about 15 cents per ton, turning out from 75 to 100 tons per turn. To-day on some of the modern steel rail mills less than 1 cent per ton is paid for doing the same work, and yet by the end of the year the roller in the rail mill to-day can make as much money as he did when he received the above higher prices under the old method of working, and that, too, with less physical labor.

At one time 45 cents per ton were paid for heating iron for making iron rails. To-day, through the use of the improved methods, very little more than ½ cent per ton is paid for doing the same work—making steel rails—and yet the wages received per month or per year are as good, and better, to-day than they were at that earlier time.

One of the most remarkable results in this direction recorded in the history of iron and steel is the price paid for rolling wire rods. At one time, about twenty years ago, a man having charge of a rod mill received \$2.12 per ton of rods made, out of which he paid no help whatever. At that time twelve to fifteen tons were considered a good day's work. To-day it has become almost common practice to make 200 tons of wire rods in a single turn; and upon the basis on which rod rollers are paid to-day, they would not receive much more than 12 cents per ton. This, however, enables the roller of to-day to make as much money as the roller did twenty years ago, producing only twelve tons per turn.

About twenty years ago 80 cents per ton were paid for heating billets to make wire rods; to-day 5 cents per ton are commonly paid, and the daily wage is higher than it was when 80 cents per ton were paid.

If some of the rollers now employed at the Homestead Works of the Carnegie Steel Company, rolling structural steel, were paid the same wages per ton that were paid twenty years ago they would be receiving from \$200 to \$250 per ton on a single day's work. On the same basis, if rod rollers to-day were to receive the same per ton that they received twenty years ago, viz., \$2.12, then for a turn's work of 200 tons they would receive \$424 per day, or single turn.—William Garrett, in Cassier's for December.

The Gunnison-Montrose tunnel in Colorado is projected through the Cerro range to divert the waters of the Gunnison river into the Uncompahgre valley for irrigation. The tunnel will start from the Gunnison, about 9 miles below the junction of the Cimarron river, and run to a point 5 miles northeast of Montrose, in the Uncompahgre valley. It will be 3½ miles in length, and the ditch will be run 12 miles up the Uncompahgre to intersect the Montrose canal. This will furnish the water for all the land in the Uncompahgre valley, and will bring into use \$280,000 already expended in ditches. Work on the tunnel has been started.

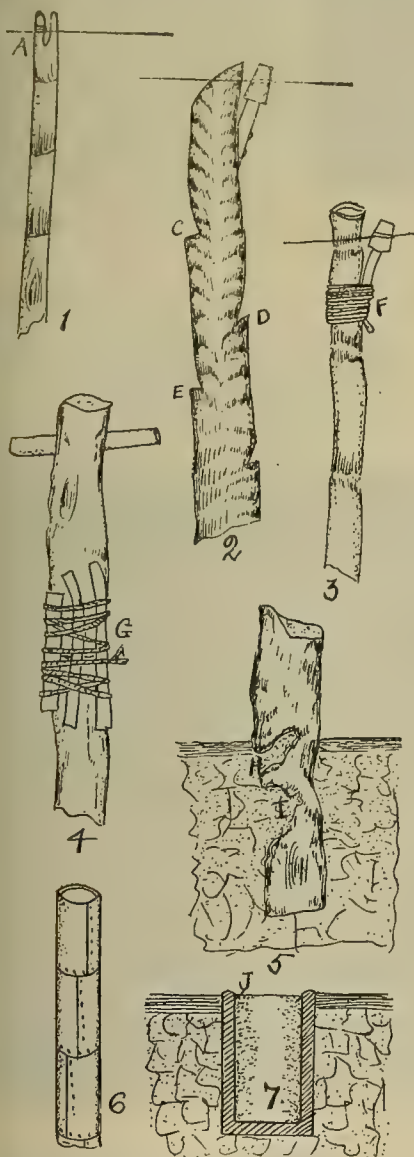
The wave motion of the sea is utilized to run an electric-lighted buoy at the mouth of the river Elbe in the North Sea. The least motion of the water is sufficient to generate the electric current, which, when not needed, passes to storage batteries. It is said generating electricity by means of floats off the shore of Los Angeles county, Cal., has been made a success.



## Telegraph Lines in the Philippine Islands.

Your correspondent served nearly three years on the islands and for a portion of that time was detailed with the signal corps in putting in new poles and wires in new districts. Our chief trouble at that time was avoiding fights with the natives, for the signal corps has other business to attend to. Next came the difficulty of getting proper stock for poles. Fig. 1 shows the kind we used in many long stretches, consisting of a pole of bamboo, cut about 20 feet long, nearly 5 inches in diameter, by a native helper of our Filipino corps, and driven into the ground by pressure after forcing a narrow opening with a pointed stick or bar, then the wire would be looped about one of the fork ends previously cut, as at A. The first typhoon would level miles of these poles. I have seen a water buffalo come along and get his horns against a drooping wire supported on these poles, and, before he could be stopped, pull down half a mile of the frail devices. The next best is the cocoanut wood, and this can be obtained in many sections and used to advantage. In Fig. 2 is a pole of this sort.

These poles are cut by native helpers as the work progresses and water buffaloes are employed to haul the poles from the groves to where wanted. Natives dig holes at proper depths for this kind of pole, and also notch it with steps, C, D, E, etc., by which means the active native linemen are able to ascend the pole at any time. There is a cedar on the islands, but it is not used very much for poles, crossarms, or other

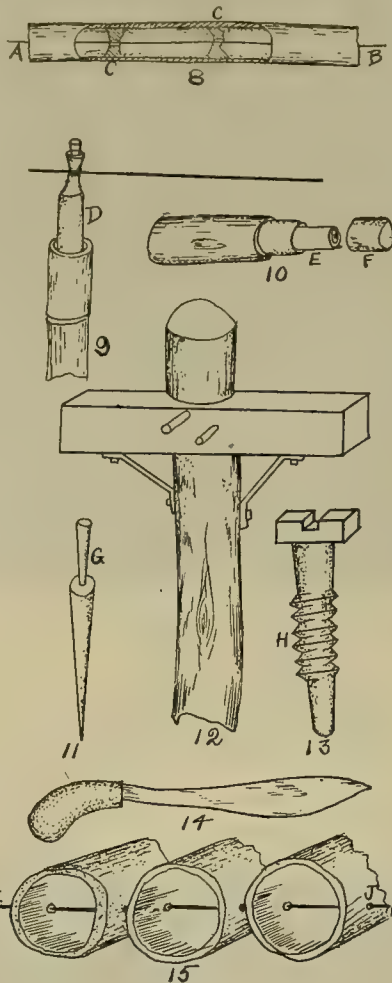


Illustrating the Setting of Poles in Philippine Service.

line work, being mostly used in the cigarbox making business. The habit of patching up poles and connections is common among the native linemen, of which there are now a large number in Government service. They do not use many crossarms, and often a number of wires are carried in singular fashion on the top of one pole. There has been a scarcity of experienced linemen until recently, and some of the line work has necessarily fallen into the hands of untrained Filipino helpers. These fellows are good workers, as a rule, but, of course, inexperienced. Instead of using nails or wood pins, in one case I observed that a squad of natives who were putting in a

short branch line for a telephone between Santa Barbara and an adjoining station, used cordage, as at F, Fig. 3. In another instance, crossarms were made like that in Fig. 4. A peculiarity of some of the native woods is the freedom with which they break off short and square under heavy pressure or when undergoing the trials of the domestic heavy winds which sweep the valleys now and then. The writer has observed poles broken off short and patched, as at G, in the latter illustration.

Possibly one of the leading trials with which any cable or other company will experience in the islands will be the inroads of the millions of white and other wood-eating ants which infest every barrio. These ants move about in bodies of millions and select wood to live upon. They can eat into the white woods, and, in fact, nearly all of the woods of the country, in a remarkably brief space. They select protected



Showing Some Work Relating to Poles and Wires.

positions, such as those under the cover of the earth, and, before one is aware, his house foundation is weakened because of the destructive work of the white ants, who are feasting upon the wood fiber in the posts of his residence. The same way poles of the telegraph system are eaten into, as at H and I in Fig. 5, and when a strain occurs the pole topples over, broken off short, close to the earth. There is nothing else to do but put in another pole and take the chances of the ants moving on to another point. In some cases protection is found by the use of sheet metal covers, like that in Fig. 6, which are made large enough to surround the end of the pole which is submerged. But even these covers are often weak in one little point, and the ants find this particular spot and make a passage through to the relished wood. Again, cement or pottery protectors are used. There are numerous native potteries in the islands in which pots, bricks, pipeware, etc., are manufactured from the rich clay deposits of the islands. Lately these potteries have been turning out weighty but effective casings, like that in Fig. 7, for sinking into the earth, and in which a pole is placed. The letter J indicates the case in section. The pole is put into position and packed tight with the clayey stuff, which hardens and makes an effective protection from the ants.

There are some odd ways employed for carrying a wire underground, or where it needs protection. The natural bamboo stock grows with partition walls at intervals throughout the center, and, in making the bamboo serviceable for pipes or other work which requires a clear passage, the partitions are knocked out with a punching pole. These partitions are merely bored through for wire service, as in Fig. 8. The portion of the side is sketched in open view, so as to show the principle of the partition service. This is at C, C, where the wire which enters at A passes through and emerges at B. The wire is thus sustained in the center of the wood protector.

Fig. 9 shows the way in which bottles are utilized

for insulators, when insulators of the proper kind are unobtainable. The bamboo pole is planted and the top cut off about 6 inches from the partition inside. Then the bottle is placed in the hole, as at D, and serves the purpose well until proper devices can be obtained.

It always interested me to observe the singular methods employed by native carriers for carrying messages to points some distance from the stations. These had to be in waterproof covers, because the natives often forded rivers. In Fig. 10 is the type of carrier often used, consisting of a tube of bamboo, cut about 8 inches long, and provided with a shouldered section over which fits the head piece F. This device receives the message enroled and inserted as shown. Then the cap is pressed on tightly, and the device is usually tight to water, unless the cap is not properly fitted. Often the shoulder is further tightened by use of pieces of hemp.

Evidently when the new lines are put into use for commercial purposes in connection with the new cable, the hard woods of the forests will be cut and set up in good form, such as have been used to advantage in many of the recent military districts during the past eighteen or twenty months. These poles are fashioned like those in Fig. 12. The wood logs are cut in the forests and hauled to the lines where work is in progress, and where gangs of native workers are ready to trim the pole and put it in form for use. These poles are sunk deep and made very secure. The crossarms are of substantial wood selected for the purpose and sawed true. They are not hacked out with native tools. Wrought iron braces are used, as shown, and the crossarm is either screwed, pinned or bolted on. Shortage of metallic devices for this purpose compels the use of wood, native-made pins, like in Fig. 11, devised by using a solid section bored through the top for the pin G, which pin is driven home after the pin is inserted, thus expanding the pin and making it fit so tightly that it can be relied upon. In Fig. 13 is a form of wood screw of native manufacture, in which there are a limited number of coarse threads at H, shaped laboriously by the handiwork of the patient native. These screws have been used to good advantage in pole operations. They cost about 2 cents each, and are made at the rate of ten per day by a native. Twenty cents per day is good pay for the native lineman or helper.

In Fig. 14 is the typical tool carried in the belt of the Filipino lineman. The blade is forged from wagon tires or other metals, after much laborious work, often lasting for weeks, a keen edge is put on and the cutting properties of the tool are remarkable.

Fig. 15 shows the way in which the natives who have stolen wire from the lines utilize the wire for house-building purposes. The bamboo poles are arranged parallel, as shown, and bored through with holes to receive strands of wire which enter at I and come out at J. These wires are inserted at intervals of about 12 inches, and they serve to hold the bamboo securely in position for flooring, bridge surfacing, roofing, side walls, etc. Linemen make rafts after this fashion—that is, the native helpers do the work, and the raft is used to carry stores down stream.—Ex-Philippine Volunteer, in Electricity.

## Automatic Railways.

The high-speed traction experiments which have lately been carried on in Germany, and in which alternating current transmission and poly-phase motors were used, seem to have been remarkably successful. If, as was shown, it is possible to obtain speeds far greater than those of our present railways, and to do this with a simplicity of apparatus that is almost phenomenal, it seems no long step to the automatic railway.

By this term is meant the railway for the carriage of goods, mails, etc., in which the cars are run without the presence of any controlling intelligence aboard them. There seems to be no reason to-day why the railway may not be regarded as a mechanical unit, and with electrical methods of control and power transmission why the intelligence necessary for the guidance of its cars can not be concentrated at a stationary point instead of distributed in the trains themselves. Perhaps to-day it would be a step too far to suggest that such a method could be applied to passenger trains, but is there any reason whatever why it should not work practically for merchandise carrying trains and why we may not live to see the high speed mail and express railway running long distances and controlled from a central office at some convenient point?

The idea is not as chimerical as it may seem. Perhaps the largest factor in the expense of operating railways to-day is the labor cost and a good deal of this cost is due to the high wages earned by the excellent class of men necessary to direct the movements of trains from the locomotive cab. In these days of automatic and labor-saving machinery it seems that the automatic engine driver must certainly come. How easily an automatic railway could be designed should be evident to all who are familiar with the applications of electricity to railroads, while its value, for certain purpose, is incontestable.—Electrical Review.



## The Modern Method of Finding New Elements.

Written for the MINING AND SCIENTIFIC PRESS by  
EDWARD BOOTH.

The number of elements of which the earth consists is unknown. The latest and most authoritative list contains the names of about eighty; but, at the same time, it is announced that there are several more in sight, only waiting to be actually discovered. Recent work with the spectroscope and in other ways has shown results that can only be explained on the theory that elements not yet isolated have an existence. Of the whole list of elements, however, not more than a score or so are common; the remainder are rare and unusual, and the more recently discovered elements are almost without exception of this latter class. It is not impossible that an element yet undiscovered may exist in considerable quantity, as was shown when argon was found a few years ago, and may join the ranks as one of the common elements, but the chances are very much against it.

The method of seeking new elements popular at the present time seems to be rather to more careful working over of old material by improved processes than by exploration of new ground; and, as a result, the more recently discovered elements agree in this peculiarity: that they all closely resemble elements previously well known—resemble them so closely that the most refined methods are needed for their separation and recognition. The more widely different two elements are, the more easily they can be separated. This follows, of course, as a natural result of their dissimilarity. And, conversely, the more closely they resemble each other the more difficult their separation becomes. If they were exactly similar in properties, separation would be an impossibility, for the two elements would not be different, but would be the same. In cases of close similarity, it is necessary to search closely for some dissimilarity, however slight, and make the best use of it. The smallest difference in similarity or volatility can be utilized, if its existence be recognized.

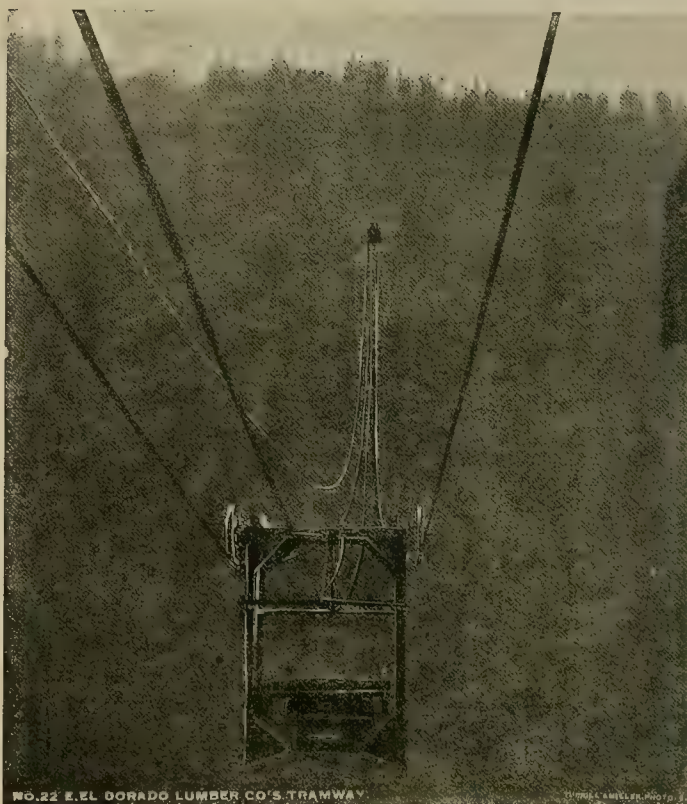
It was the fact that Prof. Baskerville of the University of North Carolina noticed an unexpected reaction in the behavior of a compound of the element thorium that caused him to investigate more thoroughly and led to the discovery of the most recent of the new elements, which he has called carolinium. This element so closely resembles thorium in its ordinary behavior that its existence was not previously suspected. When thorium compounds were treated with various reagents, either in the course of analysis or in the preparation of other compounds, the new element formed precipitates when thorium formed precipitates, and dissolved when thorium dissolved. It was the discovery by Prof. Baskerville that the two elements acted differently in relation to sulphurous acid, that made a separation of the two and a recognition of the new one a possibility.

Argon is, however, the most notable instance in all chemical history of an element escaping recognition on account of its similarity to another well-known element. It is a gas and a constituent of the atmosphere to the extent of something less than 1%—a considerable quantity. But its properties are very similar to those of nitrogen, which constitutes four-fifths of the atmosphere. More than 100 years ago Cavendish foreshadowed the discovery of argon by announcing his belief that there was something in the air in addition to the usually recognized constituents. But air was analyzed thousands and thousands of times in the succeeding century without a suspicion of the existence of argon, until a half dozen years ago Lord Rayleigh noticed that the weight of atmospheric nitrogen was slightly greater than that of any other nitrogen. The difference was extremely small, but was constant. An investigation to discover the reason resulted in the isolation of argon.

And argon itself, at first believed to be a single element, proved to consist of at least five elements so similar in properties that their separation baffled the efforts of the most successful chemists until the experiments with liquid air furnished a method.

The most remarkable of all the elements discovered within recent years, radium, is so much like barium in most of its properties that chemists refused for a long time to acknowledge its existence as a separate element. Radium, once separated, showed certain properties not possessed by barium,

but they were not such as would assist in separating the two elements. The separation was effected by taking advantage of a slight difference in the solubility of certain very similar compounds of the two elements. And almost simultaneously with the discovery of radium came the announcement of the discovery of two other elements—one polonium, a twin of bismuth,



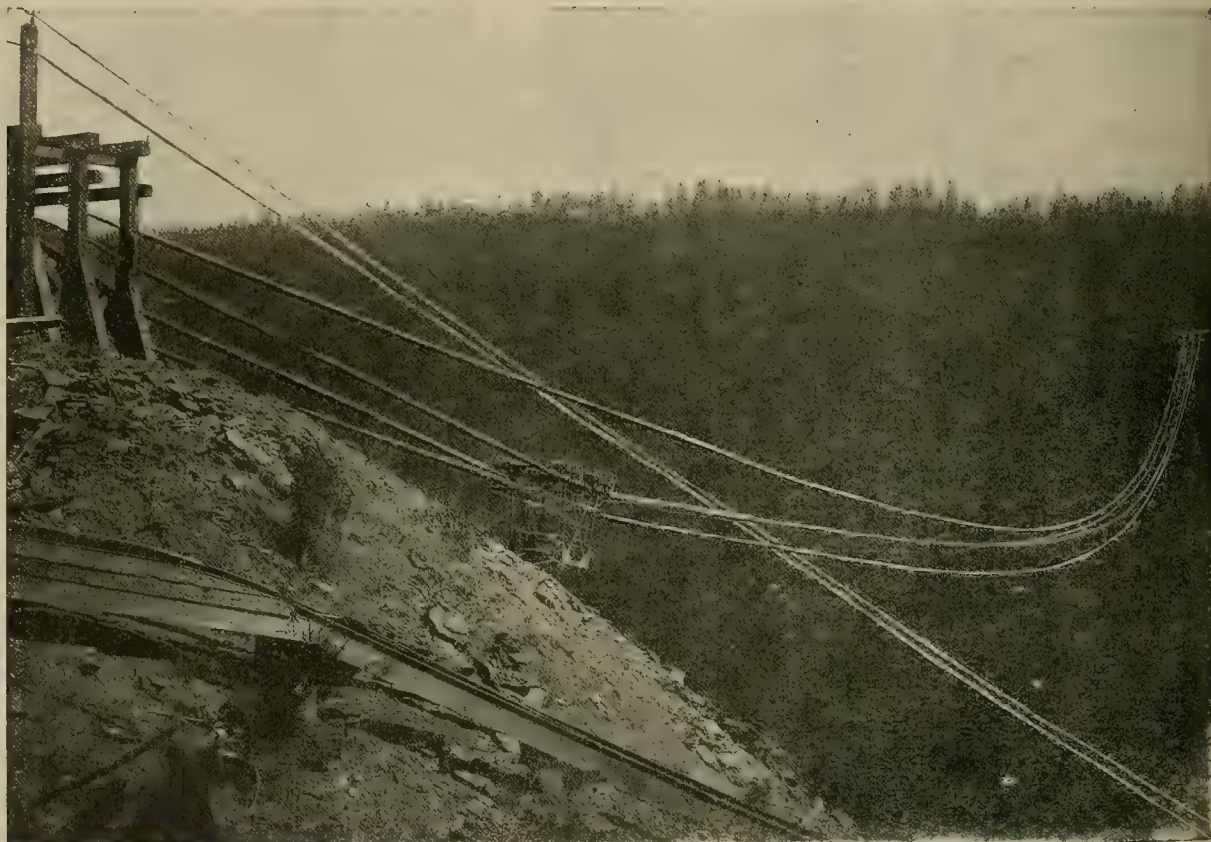
Method of Transporting Lumber Across American River, El Dorado Lumber Co. Tramway.

## El Dorado Lumber Company's Suspended Cable Tramway.

The El Dorado Lumber Co., operating in the Sierra Nevada mountains in El Dorado county, California, has the main body of its timber lands situated between the Middle and South Forks of the American river. Its nearest outlet to market by railroad transportation is Placerville, Cal., several miles south of the South Fork of the American river, which, between the timber lands, flows through a deep precipitous canyon. As the alternative to a long and costly railroad line down one side of the canyon and up the other, the company decided to install a suspended cable tramway, for which the engineers of the California Wire Works made the plans, and later constructed it. It is now in successful operation, as illustrated on this page. Of the kind and for the particular use, it is the first long-distance cross-canyon cable line in California, and would be an interesting and novel construction anywhere.

The tramway spans a canyon 2850 feet wide, while the distance between the towers supporting the rope strain is 2650 feet. The cables used are each 3000 feet long, manufactured of 1½-inch strands with a spiral wire core. Each strand of the ropes has a breaking strain of 125 tons. These cables were manufactured by the American Steel & Wire Co. specially for this service.

The tramway is composed of a double cable span system like the tracks of a railroad, below which hangs a cage suspended from eight trolley wheels. There is a narrow-gauge track on the cage,



Lumber Tramway of the El Dorado Lumber Co., Near Placerville, Cal.

and the other actinium, bearing the same relation to titanium.

How far this method of working over old material will lead is difficult to predict. It is impossible to say that any element, even the commonest, has been studied so carefully and thoroughly that it is completely known. And until an element is known in all the details of its behavior it cannot be said, perhaps, that we are absolutely sure of its purity. Still, the older commoner elements have been studied so long and worked over with so much care that the chances of sensational discoveries among them are remote. Among the rarer elements, however, this is not true. Much remains to be known about them, and there are possibilities, even probabilities, of the discovery of new elements among them at any time.

so that the lumber company can run its cars, loaded with the manufactured lumber from the mills, upon the tracks of the cage. The round trip across the canyon can be made in fifteen minutes, so that, with each car transporting 3000 feet of green sugar pine or other products of the mill, the day's capacity is 120,000 feet in ten hours.

At the landing on the south side of the canyon the cage is relieved of its carload and the tracks receive the small 9-foot car from the carriage. This movement takes but a short time, so no delay is to be considered as counting in the movement. From here the cars are sent along the track to Placerville, Cal., where the yards are located. The successful operation of this plant is expected to start a number of similar projects in California.

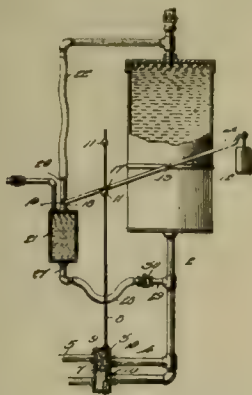


## Mining and Metallurgical Patents.

## Patents Issued November 19, 1901.

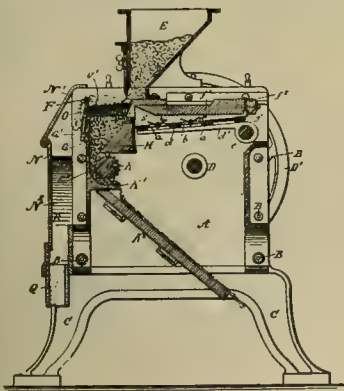
Specially Prepared for the MINING AND SCIENTIFIC PRESS

AIR COMPRESSOR.—No. 686,784; J. P. Tryner, Pueblo, Colo.



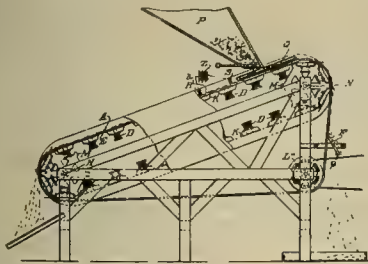
A cylinder having a valved air inlet and an air outlet, water pipes for cylinder to fill same with water and to drain water from cylinder, valves for controlling inflow and discharge of water to and from cylinder, a controlling device for water inflow and discharge valves, controlling device being controlled by overflow of water from cylinder, and controlling device comprising a lever, a rod secured to valves and arranged adjacent to lever; knobs upon rod adapted to engage lever, a receptacle lever, a connection between upper end of cylinder and receptacle, to conduct overflow water from cylinder into receptacle to overbalance lever to cause it to swing and change positions of valves at limits of its movement, an outlet for receptacle, comprising a valved flexible tube connecting the upper end of the receptacle with air reservoir, a flexible tube leading from bottom of receptacle to water pipe cylinder, and a valve adapted to automatically release water from receptacle after cylinder has been emptied.

MACHINE FOR SEPARATING ORES.—No. 686,741; S. R. Krom, Plainfield, N. J.



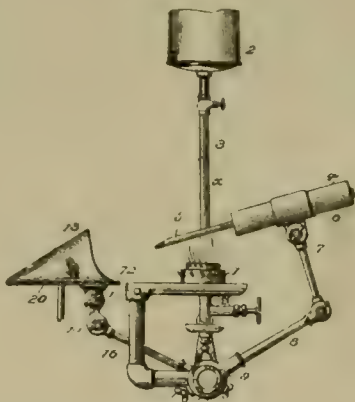
A bed upon which ore is received formed of tubes of openwork material covered with fine wire netting and having strips at bottom edges of sides for holding materials together, a crossbar and trough-shaped plates for supporting ore bed tubes at their ends adjacent to bellows, plates v' firmly secured within openwork tubes at one end of ore receiving bed, a dam adjacent to and parallel with plates v', hoppers along one side of and below ore bed and discharge pipes therefrom, a flap hinged to and extending upward from hoppers, a receiving hopper upon opposite side of ore receiving bed, and adjustable device at mouth of hopper for regulating supply of material upon receiving bed.

MAGNETIC SEPARATOR.—No. 687,053; R. McKnight, Philadelphia, Pa.



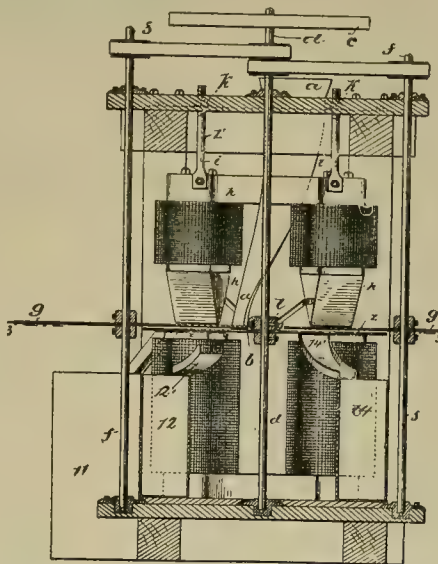
An upwardly traveling belt, having a straight inclined surface of considerable extent, a series of magnets situated behind inclined portion of belt and having poles of different polarity presented toward belt and traveling upward with belt, and means for feeding material to be separated near top of inclined surface, and mechanism for separating belt from magnets after belt has attained top of incline.

BLOWPIPE.—No. 686,758; D. C. Patterson, Cincinnati, Ky.



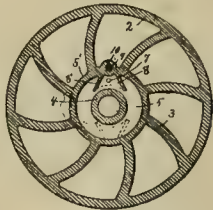
The burner, a work holder and a blast-creating device comprising a tube connected with a holder containing a liquid to be vaporized by flame of burner and serving to project flame upon work.

MAGNETIC SEPARATOR.—No. 686,889; H. M. Daggett, Philadelphia, Pa.



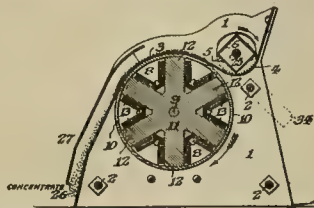
A frame supporting three parallel shafts, means for rotating shafts, a disk or annulus carried by one shaft, two disks or annuluses carried by other shafts and overlapping first disk or annulus and a plurality of electro-magnets, having poles provided with sharp edges, which lie closely above overlapping portions of overlapping disks or annuluses, and in lines tangential to lines of movement of disk or annulus immediately under them.

MINE CAR WHEEL.—No. 687,027; F. C. Hocken-smith, Pittsburg, Pa.



Wheel hub having an oil chamber continuous therearound and an auxiliary chamber within continuous chamber and projecting inward from outer wall with its inner end in close proximity to inner wall of chamber, inner end of auxiliary chamber being open and end walls 8' thereof having outward convergence.

MAGNETIC SEPARATOR FOR ORE OR CONCENTRATES.—No. 686,835; M. Ruthenburg, Philadelphia, Pa.



A magnet drum, comprising a cylindrical casing; a supporting shaft arranged in concentric relation with drum; a magnet core connecting shaft and casing; electrical conductors arranged to produce a magnetic field comprising core; a housing provided with bearings for shaft and arranged to uphold material treated; a trough-shaped receptacle for raw material fixed with respect to housing; a screw

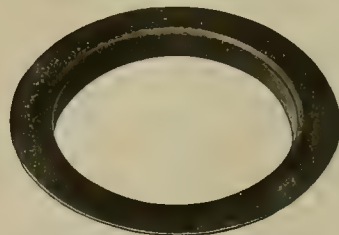
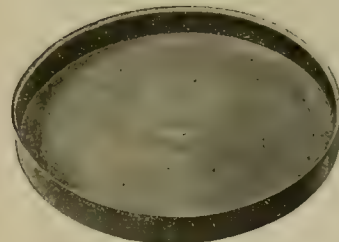
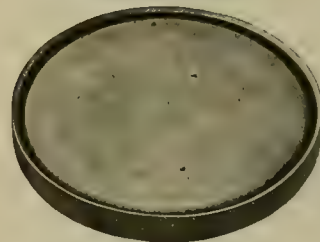
shaft provided with spiral conveyors, mounted to rotate in housing, and arranged to progress material within receptacle in direction parallel with shaft; means to contemporaneously rotate drum and screw shaft, in definite relation; means to energize magnetic field during rotation of drum, and induce progression of magnetic particles of material treated, upon housing, in direction opposite to direction of rotation of field; means to discharge concentrated magnetic particles; and means to discharge gangue.

TREATMENT OF ZINC ORES.—No. 686,915; H. M. Taquet, Argenteuil, France.

First subjecting a solution containing sulphate and chloride of zinc to action of oxide of an alkaline-earth metal and thereby obtaining by precipitation an artificial product composed of oxide of zinc and sulphate of alkaline-earth metal and then subjecting the product mixed with carbon to heat and thereby obtaining at one and same operation metallic zinc and residue of alkali-earth metal sulphide.

## The "Wear Well" Hydraulic Leather Packings.

The Detroit Leather Specialty Co. of Detroit, Mich., are placing on the market hydraulic "U" flange and cup packings, which are formed by special hydraulic machinery and made of leather specially tanned for them. The different styles and shapes of



packing are shown in the accompanying group of halftones, reproduced from photographs. The pyramid serves to illustrate cups made up in sizes from 6" to 36" in diameter. They also furnish stock for any who have forms of their own and who prefer to make their packings.



They are supplied by the  
Keuffel & Esser Co., 127 Ful-  
ton street, New York. The  
Pacific coast branch is at  
303 Montgomery street, San  
Francisco, Cal.



# MINING SUMMARY.

Specially compiled and reported for the  
MINING AND SCIENTIFIC PRESS.

## ARIZONA.

### COCHISE COUNTY.

The water level in the big shaft of the Consolidated Co. at Tombstone has been reached at a depth of 569 feet and further sinking is discontinued until the installation of the pumps to drain the lower levels. The men employed in the shaft are working on the drifts run to connect with the old workings. The pumps, it is expected, will be in place by January or early in February.

### COCONINO COUNTY.

J. Hance of Flagstaff is now Supt. of the asbestos mines in the Grand canyon. He will start work at once and during the winter will employ twenty men. No asbestos will be shipped at present.

### GILA COUNTY.

At the Arizona Com. Co.'s Copper Hill mine, near Globe, work is now confined to the 400-foot level to continue it into the Cochise claim for a distance of about 900 feet from the shaft. N. L. Amster, consulting engineer for the company, has bonded the Great Eastern group of copper claims, adjoining the A. C. Co.'s mine, from H. Sultan and J. B. Newman and has started development work. He has also arranged to start work on the Newman claims, near Troy, as soon as machinery can be placed on the ground.

### GRAHAM COUNTY.

J. W. Hazen, treasurer of the Shannon Copper Co., says the development in the Shannon mine, at Clifton, is increasing ore in sight. In the Harrison tunnel, which is the deepest working, there are 140 feet of 8% sulphide ore, then 30 feet of low-grade ore, then the tunnel runs 35 feet into high-grade oxides. This 35 feet gave an average assay of 10 1/2% copper. A new tunnel, called the Wiseman tunnel, has been started on the White Horse, which will be much lower than any other working now on the property.

The Stevens group and the Keating group of claims at Clifton have been sold to Bridgeport, Conn., people, represented in Arizona by J. N. Wardner. There are twenty odd claims in the two groups, some of which have considerable development work and much ore in sight. An electrical power plant on the river is projected.

### MOHAVE COUNTY.

The Gold Standard mine, on the Santa Maria, near Kingman, which was operated years ago by the cyanide process, after running a tunnel on the vein a few hundred feet, the company lost the ore body and the mine and mill were closed down. This fall a miner was employed to do the annual assessment and was given permission to work where he pleased. He went into the tunnel, ran a crosscut and cut the ore body running parallel with the tunnel at a distance of 10 feet. It is said the mine and mill will start up again.

O. P. Posey and C. K. McCormick, of Salt Lake City, Utah, have bought a group of gold mines out of Kingman about 12 miles and upon the banks of the Colorado river, which they have been opening up for several months under the direction of G. H. Kislinsky. Mr. Posey says the ores that have been blocked out, and for the treatment of which a mill will be erected next season, show an average of \$25 gold per ton. The mine is now equipped with machinery, and four air drills are working on a 15-foot vein. The Colorado river offers abundant water for power and for a mill.

A 20-stamp mill on the Colorado river near Scanlon's Ferry is projected to handle ores from the Lost Basin and Gold Basin mines.

### PIMA COUNTY.

C. F. Schumacher of Tucson has sold his half interest in seventeen claims in the Canyon del Oro mining district to F. Olsen for, it is reported, \$25,000. C. Bauer of Tucson owns the other half interest. About 1000 feet of development work has been done on the group. The values in the ore are gold, silver and copper.

The Narragansett copper mines, in the Santa Rita mountains, southeast of Helvetic, it is reported, have developed good ore bodies. The mines have been bought by the Con. Gold Mountain M. Co., which has also bought the lately discovered mines in the Galurios from P. W. Fleming & Bro. of Tucson.

### PINAL COUNTY.

The Bob Tail Mines Co. is operating property at Ray which has been developed during the last four months. L. H. Eldred is superintendent and has seven men employed. He says the vein is increasing in width. The company has decided to erect a 5-stamp mill on this property at once.

## SANTA CRUZ COUNTY.

G. A. Lonsberry, representing Boston, Mass., people, has bought from the Bacon estate of San Francisco, Cal., the old Belmont mine at Washington Camp. It is a silver and copper proposition, said to be very rich. Work on the mine has been started.

### YAVAPAI COUNTY.

The Decatur C. M. Co., at Jerome, W. S. Owens Supt., is down 300 feet in the shaft and the lower drifts show rich copper sulphides in a slate formation.—The Brookshire and George A. Treadwell mines join the Decatur. E. S. Treadwell is manager and G. Hill foreman. Considerable development has been made on both claims. A tunnel is now being driven on the Brookshire to make connection with the main shaft, about 300 feet deep. The company is said to be considering the putting up of a smelter.

Mr. Monroe, manager of a New York company, is operating the Verde Chief mine, near Jerome, and also the White Horse group, near Prescott. They are doing development work on both properties.

The Mohawk M. Co. has been incorporated by E. Greenwood and A. Falco of Prescott, G. J. Atkins, F. B. Leigh and F. C. Rutan of Chicago, Ill., and H. G. Brown of Pittsburgh, Pa., to mine the Mohawk group, in Pine Creek district, bought from T. Roach. It has some 5000 feet of openings and a 4-stamp mill. E. Greenwood is manager.

The Del Rio Smelter Co., E. A. Haggott Supt., has bought the ranches of J. C. Snow and J. T. Shivers in Chino valley for the site for a copper smelter of 200 tons capacity which the company will build. The lands bought are located on the railroad, 20 miles north of Prescott, and have a large supply of water.

E. F. Bacon of Detroit, Mich., is manager at Prescott of the Hoyt M. Co., composed of Michigan people, who have bought and are preparing to develop a group of five claims on Lynx creek, near Prescott. F. Caghey is president and H. T. Morley vice-president, both of Detroit, and C. Noble of Brown City, Mich., secretary and treasurer of the company.

At the Empire Extension mine, near Prescott, the ore body is said to be widening out. At a depth of 110 feet the ledge is 4 feet wide and gives an average assay of \$9 per ton gold.

## CALIFORNIA.

### AMADOR COUNTY.

At the Buena Vista copper mine, below Jackson, work has been started in making a road, preparing to build a boarding house and clearing for the machinery. A 26 H. P. engine and boiler have been bought.

At the Mahoney mine at Sutter Creek, since the present owner bought the mine, the suggestion of Supt. J. Ross, Jr., has been acted on and the shaft started downward, resulting in striking the apex of a shoot of ore, which it is thought will pay about \$10 per ton.

On the Orr ranch, north of Plymouth, a discovery has been made of croppings over 200 feet long, varying from 3 1/2 to 6 feet in width, in the bed of Indian creek, with a pay shoot, some of which is very rich in visible gold. The foot wall of the ledge is blue slate and the hanging wall is greenstone. The vein is 1/2 mile north of the Empire mine and it is believed to be the main fissure vein of the mother lode and the extension running north of the Empire and Pacific, which have yielded over \$10,000,000.

### CALAVERAS COUNTY.

The latest dividend of the Gwin Mine Development Co. was paid on the 20th inst. In the present year this company has paid in dividends \$115,000 and a total in dividends to date of \$266,000.

The work at the Oriole mine, at Angels Camp, is confined to drifting on the 400 level, the heading being now in a fine prospect. Sinking will be commenced to go 300 feet deeper, making the shaft 840 feet deep.

At the Baltimore, at Angels Camp, the shaft is now down 105 feet. It has cut a shoot which runs from \$2 to \$45 free gold and the sulphurets \$60 per ton.

C. Rasberry has an asbestos mine near Copperopolis, on which he is doing development work.

At the cyanide plant at Indian Creek, near Murphys, large quantities of the old tailings are daily being handled. The owners of the mine are making projects for future working.

### EL DORADO COUNTY.

A. J. Johnson and E. S. Hadley, of Sacramento, own an asbestos mine between Greenwood and Georgetown. They bought the property as a gold mine but have developed a 3-foot asbestos ledge, 20 inches of it being fiber and the remainder of asbestos rock.

Philadelphia people, represented by

F. S. Chadbourne of San Francisco, have bought the slate quarries near Placerville from Mrs. E. Larned. The quarries have been closed down for some time. It is now announced that the buyers will equip the properties with machinery for the manufacture of roofing slate on a large scale. F. S. Chadbourne is general manager of the new company and D. L. Williams of Placerville is Supt.

### NAPA COUNTY.

The St. John quicksilver mine, near Vallejo, has been sold to San Francisco people, represented by F. W. Page. This mine, between the years 1870 and 1875, produced considerable in quicksilver. It has been closed down twenty years. It is the intention of the new company to commence work at once.

### MARIPOSA COUNTY.

U. Roy of Merced and D. van Doesburgh of San Francisco are starting to develop some quartz mines at Indian Gulch on land owned by the Hotelling estate of San Francisco.

### MONO COUNTY.

Work on the custom 10-stamp mill at Bodie has commenced and the completion of the building and the placing of the machinery is to be rushed. The power pipe line has been overhauled and made ready for work.

### NEVADA COUNTY.

Petroleum, hauled by wagon from Truckee, is to be used in Meadow Lake mining plants. The wagons have a capacity of about 800 gallons. It is believed that oil can be taken in cheaper than wood on the ground can be cut and delivered.

### PLACER COUNTY.

The tunnel in the Bob Lewis No. 2 gravel mine, at Damascus, is now in 760 feet. At present Supt. Jarvis is making 10 feet heading per day. A new blacksmith shop, office, changehouse and barn have been erected. Lumber is on the ground for dumphouse and sluices.

At the Ralston Divide G. M. Co.'s mine near Michigan Bluffs, work of development is being pushed. P. Espinas is superintendent.

J. Smith and J. J. Blake of Salt Lake City have taken a bond on the Spanish quartz ledge at Forest Hill. Supt. Baker will extend the main tunnel 100 feet and also sink 100 feet on the ledge. The mine is owned by J. Acuna, E. Bryant, J. Romoldo and others of Forest Hill.

It is reported that an excellent body of good gravel has been crosscut in the upper lead of the Mayflower mine at Forest Hill. This is the lead that paid \$2,000,000 in the front workings of the Paragon mine at Bath. Fifteen men have been put on and arrangements have been made to start the mill.

### SACRAMENTO COUNTY.

A rich strike has been made by Oakland people operating near Mormon island in the Gray Wing drift gravel mine, the pay being said to run from \$18 to \$20 a pan. J. A. Britton, J. P. Burnham, D. P. Gray, J. A. Joyce and A. L. McPherson are the owners, the ground being 480 acres on the old Plumb ranch close by the Blue Ravine mine, the location being about 4 miles northeast of Folsom. McPherson says that in the south drift, which has been reached by an 80-foot shaft to bedrock, there are 7 feet of gravel, while in the north drift there 6 feet of gravel. He estimates that at least \$1500 a day can be taken out. It is said that some of the pans have run as high as \$90.

### SHASTA COUNTY.

The machinery has been received by W. G. Scott, consisting of boiler, engine, hoist and pump, for installation on a Kosk creek copper property northeast of Redding which he is developing. The mine belongs to W. Mural, R. M. Saeltzer, Braynard & Perry and others of Redding.

The Midas mine at Harrison gulch is using twenty stamps constantly. Ore has been struck on the sixth level.

On the divide between Hall City and Harrison gulch the Poston quartz mine is claimed to show platinum. Kidneys of ore are often found bearing a gray-looking mineral, which Dr. Day of the United States Geological Survey declares to be platinum.

The disposing of the slag from the Keswick smelter, it is reported, is to be finally settled. Since the smelter started the slag has been turned into Spring creek and carried into the Sacramento river. Redding, Red Bluff and other towns draw their water supply from the river, and it has been claimed that the slag pollutes the water. Now it is announced that the Mountain Copper Co. will build a dam at the mouth of Spring creek. The water will rise and flow over this, but the slag will collect behind it. As a permanent dumping ground for the slag an unused ravine is to be prepared and a small stream diverted down it.

The Donkey mine, in the Furnaceville

district near Redding, has been unwatered. The mine was formerly the property of the Tehama M. Co. Its ore carries gold, silver and copper, the rock averaging \$40 a ton and some of it going as high as \$77. Former attempts to mill the rock for gold were not entirely successful and the mine, opened down 220 feet, was closed and filled with water. A bond was recently secured by S. D. Morgan of Oakland, who is reopening it. He expects to put in a forty or fifty-ton smelter, and work the mine. He says that the vein is 12 feet wide, carrying an average value of \$40 to the ton.

### SIERRA COUNTY.

S. Irvine of Nevada City has struck a quartz ledge of which the croppings prospect well. He proposes to organize a company and work it in the spring.

W. Wolf of the Ruby mine, near Downieville, says fourteen men are employed taking out ore, and that the mill will be started up again.

At the Telegraph mine at Fir Cap, near Downieville, the tunnel is progressing and has been started to prospect for the channel.

### SISKIYOU COUNTY.

A. R. Vining, of San Francisco, has started the construction of buildings, ditches, reservoirs and grades for a complete hydraulic plant on the Deadwood placer mines, near Yreka. It is proposed to prepare to commence operations this season.

A. S. Hathaway, owner in the Hathaway group, near Callahans, says there are parallel veins in the mine, one of which is about 85 feet wide, between well-defined walls. Over a thousand feet of tunneling, and other development work, has been done. At the present depth copper seems to predominate, and Mr. Hathaway says that if a custom smelter is not built by spring he will put one up on this mine himself. From one of the smaller veins ore averaging \$100 was shipped.

J. M. Hansbrough, of Ashland, Or., has bought the one-seventh interest of D. McCarthy in the Ajax mine, near Cole. The owners of this mine are making preparations for increasing the development work.

The Cherry Hill Q. M. Co. is now putting in another compressed air boiler at their mine on Cherry creek, near Yreka. Work in the 1500-foot tunnel is progressing rapidly.

### TRINITY COUNTY.

Eight miles of 30-inch pipe have been laid along the line from the Sweepstake mine, near Weaverville, to the headwaters of East Weaver creek. Unless interfered with by stormy weather the work of bringing on water to the mine from East Weaver will be completed in about three weeks. At the mine preparation is being made for the winter work and the big reservoir is nearing completion. The company may have a limited supply of water on the mine for this winter. The Canyon creek pipe line cannot be completed before next season.

Hall City, just over the line in Trinity county from Harrison gulch in Shasta county, has a mine which is believed to be a continuation of the rich Midas mine at Harrison gulch. A 10-stamp mill is projected for it. The mine is operated under bond by the Americus M. Co., composed of San Francisco people.

The upraise from the lower tunnel on the Brown Bear mine at Deadwood has broken through into the shaft that was being sunk on the Monte Cristo ledge. The upraise was 380 feet in length when the connection was made. Supt. Dobler says that everything about the mine is looking well.

### TUOLUMNE COUNTY.

The New Era mine at Carters, it is reported, has a large body of high-grade ore in sight. Five stamps are kept running. C. A. Holland, who is also Supt. of the Providence mine, is Supt.

Supt. Kane reports that work has been resumed at the Dead Horse mine at Carters with thirteen men, most of whom are employed driving in the 1600-foot level. The mill is not to be started up for some time.

At the Mt. Jefferson mine at Groveland J. M. Melgham Supt., eight men have been added to the regular crew and the twenty stamps are dropping steadily.

The assay office and blacksmith shop of the Alameda mine have been moved to the B. Soulsby mine, above Arastaville, which, with the Donella and Pleasant Hill mines, has recently been bonded by San Francisco people. The new owners have started work. The bond of the three claims is for \$15,000, \$1500 of which is cash.

R. B. Stanford, representing New York capitalists, has taken a bond on eighty acres of deep gravel near Sonora from Doyle Bros.

C. T. Lindner, president and manager of the Tuolumne Power & Development



Co., says that he expects to have the power plant at Jacksonville completed and in operation by September 1, 1902.

#### COLORADO.

##### CLEAR CREEK COUNTY.

The Newhouse tunnel at Idaho Springs was advanced 264 feet in October—the best month since starting. The new dynamo for operating the electric locomotive is in place and the tunnel has been finished by wiring to substitute electricity for mule power. All of the companies working in the tunnel are making headway on their veins, with considerable ore in sight.

The East Santa Fe mine at Idaho Springs is showing up 4 feet of ore in the 320-foot level. The values are about \$17 a ton. The Santa Fe M., M. & S. Co. has been incorporated by Colorado, Minneapolis and Chicago people to operate the mine. A new plant of machinery is to be installed by A. Anderson, manager. The ores are sulphide and will pay to treat by the pyritic process.

R. C. Vidler of Idaho Springs and Wright, Lilly & Co. of Colorado Springs have revived the old Bradford Locke project to drive a tunnel from a point  $\frac{1}{2}$  mile from the mouth of Fall river to cut under the Kinda, U. P., Specie Payment, Champion and large shipping veins on the Idaho Springs side of Bellevue mountain, and thence under the Topeka and into Quartz hill, in Gilpin county, through the "Patch." They have incorporated the Lucania Transportation, Mining, Tunnel & Drainage Co., capital \$2,500,000. Work has been commenced by hand until the compressor plant is installed. The size of the tunnel will be 8x8 feet in the clear, and it will be equipped with a double track, a waterway being laid between the tracks. The property consists of forty-one claims on the line of the tunnel. The company has bought the Osborne placer and water rights on Fall river, which gives a fall of 91 feet, providing power for operation. A feature of the tunnel is the great depth it will attain. In the first 5500 feet it gains a perpendicular depth of 2200 feet. The total length of the tunnel, as projected, will be about 12,000 feet, and it will cut in its course over 100 shipping veins.

In operations recently begun at the Santa Fe mine Manager Anderson reports cutting 5 feet of pay ore assaying \$17 a ton in the drift from the shaft. The mine had been closed for some years until Milwaukee and Chicago people started the present operation.

It is reported that the Georgetown Deep M. & T. Co. has contracted for a plant of machinery, including an air compressor, for the Kelly tunnel at Georgetown. This tunnel is intended to cut through Democrat mountain for 2 miles or more, to open the veins at from 500 to 2500 feet depth.

##### FREMONT COUNTY.

The Tremont mine at Taclamur, west of Florence, has had a large plant of machinery installed on it. The vein is 10 feet wide and has an average value of \$15.60 per ton.

##### GILPIN COUNTY.

The Gauntlet G. M. Co. at Central City, P. N. Rugg manager, reports that the vein is now about 3 feet in width. The intention of the company is to keep up development work to thoroughly open the property.

Sinking is being done at the Defiance mine, Russell Gulch, near Central City, and the shaft is now down 165 feet. W. S. Robertson, manager, says the company will sink the shaft to 200 feet. A shipment of the first-class smelting ores during October gave returns of \$213 per ton. This mine is being operated by New Orleans, La., people as the Defiance G. M. Co.

The Rome-Gardner G. M. Co. is sinking at the Clark-Gardner mine, with the shaft down 900 feet. Stopping is being carried on in the 600, 700 and 800 foot levels, and some milling and smelting ores are being taken out. The smelting ores show a fair amount of gray copper, and are said to carry very fair values. J. W. Bostwick is manager.

Manager M. D. Draper of the Town Topics G. M. Co. at Central City, says the company will start sinking on a lift of 50 feet in the East Notaway shaft, taking it down to the 600-foot level. The pay streak is about 8 inches wide, and forty-five men, principally working under tribute, are getting out shipments.

Sinking is being carried on in the Boodle mine, at Eureka, and the shaft is now down nearly 245 feet. When the shaft is down 300 feet drifting will be commenced to get stopping ground. No stopping has been done from the 200-foot level. A Jeanesville sinking pump has recently been put in. W. J. Richards is manager of the Boodle M. Syndicate, Ltd., which company recently bought the mine, paying, it is said, \$40,000 for it.

The Butler Con. M. Co. has bought the Butler mine, at Central City. The shaft

building will be repaired and a plant of machinery installed. G. W. Mabey, Jr., is president of the new company, with R. Codman, Jr., secretary and treasurer. Grading has commenced in Chase gulch, Central City, preparatory to the erection of a new mill for the Bonanza Tunnel Co. It will be fitted with twenty-five stamps, crushers, amalgamation plates, Gilpin county bumping tables and Wilfley tables.

The new mill building at the Buell mine, Central City, has been completed, and the work of retimbering and reopening the shaft and levels is finished. The Portland mine, at Wall Street, owned by the Quo Vadis Co., composed of Denver, Colorado Springs and Boulder men, is showing increased value. The shipment sent last showed values of \$4 to the ton. The vein is from 15 to 30 inches wide, with free gold showing all through it. The mine is being worked by a tunnel, now in some 90 feet. I. Moore is president and manager and G. O. Ferguson is secretary.

##### LAKE COUNTY.

T. Goodwin, J. C. Kortz, H. G. Reddington and other members of the New Monarch M. Co. are proposing to establish an independent smelter near Leadville, probably at Salida, but this has not been definitely decided upon. Since the closing down of the Boston plant the New Monarch has had to cease production, although in ten drifts and crosscuts from the Little Winnie alone large reserves of copper sulphide ores have been opened up, capable of yielding not less than 150 tons a day. The New Monarch shaft has been deepened to 700 feet. The New Monarch alone, it is believed, can take out 250 tons a day of desirable ore.

Arrangements are being made to begin regular shipments from the new strike made on the old Big Four property, Leadville, J. Walsh of Leadville Supt. The strike made in the new shaft, at 275 feet, shows a gold-copper vein, the ore of which, it is said, will average between \$20 and \$30 a ton.

The South Winnie Leasing Co. of Leadville is shipping from ten to fifteen tons a day of gold ore which also carries silver and lead values.

##### LARIMER COUNTY.

It is reported that the Boston & Colorado C. Co. will resume operations on the Empire mine, near Fort Collins. S. Stark of Denver is Supt. The shaft, now 200 feet deep, will be sunk to 500 feet.

##### OURAY COUNTY.

The metal production of the county for the first nine months of 1901 has been as follows: Gold \$1,581,698.30, silver \$1,341,067.70, lead \$493,174.62, copper \$64,030.30; total \$3,479,970.92.

The Treasury Tunnel, Mining & Reduction Co. at Ouray will operate all winter, with W. J. Hammond Jr. Supt. This tunnel, which has been under construction for two years, is in 2500 feet, headed toward Ingraham basin, and will cut the veins of the Tom Boy, Argentine, Japan, Sheridan and Columbia mines. A compressor, air drills and other improvements have been added this summer to the plant. The track is composed of 30-pound steel rails and is directly connected with the Silverton Railroad.

##### SAN JUAN COUNTY.

The Ledge M. Co. plant at Silverton, destroyed by fire, will be immediately rebuilt. The loss was \$20,000, comprising the new shaft-house and the old mill. The insurance is \$10,000. A new mill will be built next spring. The shaft-house had just been completed over the vertical workings and equipped with new machinery.

##### TELLER COUNTY.

Terrill & Burke, the lessees who have opened up a large ore body on the surface of the Colorado Boss claim on Gold hill, Cripple Creek, have made a 50-ton shipment of high-grade gold ore. The shaft from which the ore came is 8 feet deep, sunk in ore, with but one wall in sight. A contract has been let to sink to 100 feet in a shaft which will be equipped with machinery.

The Ledge M. & M. Co. has decided to immediately re-equip the property with a complete surface plant to replace the one destroyed by fire. The fire only burned about 30 feet down the shaft, which will be retimbered without delay. The new hoist machinery was saved with slight damage, and can be easily repaired. It has been decided to build a temporary shaft house for the hoisting plant. The new 150-ton mill planned several weeks ago will be built immediately.

At the Newell tunnel in Grouse mountain, at Victor, work will be resumed on a large scale about Jan. 1. The tunnel is now in about 1500 feet and has cut several veins of ore carrying values of from \$2 to \$15 gold to the ton.

It is stated that when the Portland mine was examined in October, 1901, by

F. M. Bradley, there were in sight ore reserves amounting to \$25,000,000, and that since that time the mine has been adding to it. The great output of 1900, it is said, was from development work alone, no stopping whatever being done in that time. The production was \$2,351,000. During the present year, the same authority states, development work alone has been done, the bulk of the ore shipped coming out of the 1000-foot level. Several winzes have been sunk from the floor of this level and have disclosed a number of new and rich veins. The main shaft, known as No. 1, is now down to 1100 feet and is being put to 1200 feet. No. 2 shaft is down between 700 and 800 feet, while No. 3 shaft is down 300 feet. The company is building a mill at Colorado City to cost \$350,000, which will handle 300 tons of ore daily. It is stated that the Portland mill will save \$5 a ton on every ton of ore shipped, which at the present output means a saving of \$45,000 a month, or  $1\frac{1}{2}$  cents extra dividend. This mill will begin to receive ore January 1. As soon as the plant is tested and proved a success it will be immediately doubled to take care of 600 tons of ore every twenty-four hours.

The Bonnie Nell Co. will shortly install a 3-drill air compressor on its property on Raven hill, at Cripple Creek, to replace hand drilling.

McFarland & Ownbey, lessees on a portion of the Burns claim of Acacia Co., at Cripple Creek, will shortly install a 4x6 hoist, to be operated by compressed air, over the winze they are sinking on the ore.

W. L. Matthews, manager of the Mineral Assets Co., operating at Cripple Creek, is now negotiating for a larger plant of machinery and new air compressor, and expects very shortly to resume work on a large scale.

The Empire State Con. G. M. Co. has been incorporated in Wyoming. The office is in Denver and W. B. Williams, G. D. Kilborn and W. H. Spurgeon are trustees. The capital is \$312,500 and the company will operate at Cripple Creek.

#### IDAHO.

##### BINGHAM COUNTY.

The new mill on the mine of the Caribou M. Co. has been started, crushing forty tons of ore daily. The company are largely Mercur, Utah, people, consisting of M. Mahnken, F. S. Hunt and T. B. Wilde. M. D. Stackpole is superintendent. The ores average, it is reported, better than \$10 gold per ton. To economically transport the ores an overhead tramway spanning a distance of 1750 feet between the mines and mill has been constructed and is now in operation.

##### IDAHO COUNTY.

J. R. Wood, of Chicago, Ill., has bought the Blue Jacket group of mines on Salmon river, near Grangeville. The Blue Jacket group embraces nine claims and was for a time leased by Finch & Campbell, of Spokane, Wash. Since then several rich strikes have been made in the ground.

##### KOOTENAI COUNTY.

The town of Tyson, which started eight months ago, now has a store, two hotels, a saloon, a livery stable, a blacksmith shop, a postoffice, a dozen homes and a telephone line to the outside. Rucker work is now in progress on the Gold Nugget, Jumbo and Little Hero placer mines. Work on these claims will be increased as the water permits. R. Mill, owner of the Gold Nugget, is now taking out about four ounces a day. As work progresses into the bank the pay streaks are improving both in thickness and value. A prospect on the bench just west shows 7 feet of pay dirt, valued at 50 cents to the cubic foot. The claims now working are paying from \$7 to \$20 a day to the man with rockers.

##### LEMHI COUNTY.

A discovery has been made of a ledge claimed to be about 300 feet wide near Salmon City. The values, it is said, average over \$10 in gold from samples across the ledge.

##### OWYHEE COUNTY.

The Howe-Manhattan group of mines at De Lamar, owned by B. S. Howe, W. Davies, R. D. Morkill and T. Regan, all of Silver City, has been incorporated. Buildings and machinery are to be put on in the spring, but a few men will be worked on tunnel development this winter.

##### SHOSHONE COUNTY.

The Northern G. M. Co. has been incorporated, with Wallace as its office, and capital \$550,000. The incorporators and directors are C. S. Cryslar, J. M. Savage, B. M. Cryslar, H. E. Charney and C. W. Christman. The incorporation is made to work the deep placers on Lower Beaver creek, between the mouth of the stream and Delta, near Wallace. Work is to begin on an elevator plant immediately. J. Johnson, general manager for the

Etruscan G. M. & M. Co., operating at Murray, says the company has four claims on which he spent over \$30,000 in opening them up before organizing the company to build a mill. He says they propose to build a 40-stamp mill next spring. G. E. De Snell, of Butte, Mont., is president and C. M. Parr of same place secretary.

#### MONTANA.

##### BEAVERHEAD COUNTY.

The 10-stamp mill built by Rabideau & Jennes for the Queen of the Hills mine, in the Vipond district, has been started up. The Queen of the Hills contains a vein of ore about 3 feet wide. It has a 200-foot shaft. The ore is gold-bearing and averages about \$40 per ton.

##### GALLATIN COUNTY.

The deposit of corundum ore in the south end of the Gallatin valley, near Belgrade, is to be developed by a Bozeman company. The incorporators are H. Kirk, the discoverer of the deposit, C. E. McCoy, F. L. Klein and L. S. Ropes. The deposit is said to be a bedded vein from 24 to 34 inches wide, traced for 2 miles on the surface.

##### MADISON COUNTY.

F. M. Field, a cyanide operator at Pony, has sampled the tailings of the Eastern mill at Junction with a view to putting up a cyanide plant.

##### SILVER BOW COUNTY.

Tests are being made of the ores of the Alice mine, at Walkerville, with a view to saving all the metal contents of the ore separately and with a profit sufficient to warrant the operation of the plant. Under the abandoned system the expense of treating a ton of ore was such that only the higher grade ores could be used. With the process now being tested it is expected that \$4 or \$5 ore can be treated at a profit.

The Butte & Arizona C. M. Co. at Butte have sunk three shafts within 75 feet of one another, which at shallow depths have produced ore containing large quantities of free gold from a well-defined, large vein. A sample mill run is claimed to have yielded at the rate of \$200 per ton. The company has made arrangements to have hoisting and pumping machinery on the ground so that work will not be delayed. Development work in the Emma mine at Butte by the Butte M. & D. Co. is progressing. The secretary of the company, W. W. McDowell, is in Chicago conferring with the stockholders regarding additional machinery.

#### NEVADA.

##### EUREKA COUNTY.

The Eureka Con. Co. has had the air compressor and engine in place at the 900-foot level of its mine put in working order, preparatory to prospecting work being done below that level. Laird & Cardu of Ruby Hill, working on tribute in the mine since this repair was made, has found some very promising ore on the 1000-foot level. At present there are thirty-five men tributing in the mine.

##### LANDER COUNTY.

J. D. Wood of Salt Lake City, Utah, has bought fourteen claims near Battle Mountain and is preparing to begin the development of the properties at once. In the same locality Bamberger Bros. have bought a group of ten claims and will begin development at once. The ores occur in porphyry dykes cutting across the country rock and carry fair values in silver and gold. The grade of the ore is much above the average, with the ledges from a few inches to 28 feet and well defined.

##### NYE COUNTY.

The Tonopah & Salt Lake M. Co. has installed a gasoline engine of 22 H. P. on the Wandering Boy claims at Tonopah. The shaft is now down 115 feet and the first crosscut is to be run from this point to the vein, which shows very high grade ore at the grass roots.

On the Tonopah Co.'s Mizpah ledge at Tonopah the lessees continue the hoisting of ore by day and night, and while the teams now running to the railway are not sufficient to clean up the dumps daily the lessees will be allowed forty-five days after the expiration of their lease in which to remove the residue.

R. Hofer has been given a contract by the Tonopah M. Co. to build a telephone line between Sodaville and Tonopah, a distance of 60 miles. It is expected to have the line completed inside of fifty days.

##### WASHOE COUNTY.

There are twenty-eight men employed at present in the Reno Star mine, at Wedekind. The 100-foot level is being advanced and the main shaft, now down 140 feet, is being continued. The foundation for the reduction works is completed.

Nine men are employed at the English mill, near Wedekind, getting the plant in condition to develop 100 H. P. for electric



lights for the mine and town and for an electric hoist.

## NEVADA.

## LANDER COUNTY.

The Battle Mountain M. & M. Co. has been incorporated in Salt Lake City, Utah, capital \$75,000, to operate in Lander county. W. B. Land is president and E. F. Stolzenberg secretary and treasurer. The company owns the Georgia, May, Louise, Mohawk and Annie lode claims.

## NYE COUNTY.

The Tonopah & Salt Lake M. Co., capital \$300,000, has been incorporated. W. H. Dickson is president, J. E. Bamberger vice-president and A. C. Ellis, Jr., secretary and treasurer. The company will develop the Stone Cabin and Wandering Boy claims at Tonopah.

## WASHOE COUNTY.

At the Gold-Copper Ex. Co.'s mine, at Pyramid, a drift 240 feet long has been run on the 100-foot level, following the strike of the ore body. The shaft will be sunk to the 200 level and another drift run. A mill is under consideration to be erected in the spring.

## WHITE PINE COUNTY.

The Joanna mine at Cocomongo, near Cherry Creek, is reported sold by W. A. Watson to E. Hardy, the representative of Eastern people, for \$25,000, of which \$5000 is to be paid before January 1, 1902.

## NEW MEXICO.

## COLFAX COUNTY.

F. O. Watkin of Denver, Colo., has bonded the Golden-Ajax mine at Elizabethtown. The Ajax has produced a large amount of good ore in the past. Work has begun under the bond and the mill has been started.

M. Walsh, manager of the Denver mine at Elizabethtown, is making arrangements for the construction of a mill to use the cyanide process. The plant will have a capacity of fifty tons daily.

Mr. Reiling contemplates the construction of another dredger at Elizabethtown, to be operated this coming year.

## GRANT COUNTY.

The Savage G. & C. Co. of Colorado Springs, Colo., has bought copper lands near Central City for \$10,000. J. R. McKinnie of Colorado Springs, acting for the company, has started the work of development on the claims.

## OREGON.

## BAKER COUNTY.

C. C. Coolidge and G. L. Gibson, of La Grande, who have mines on Burnt river, say the pay ground which covers an area equal to 2½ square miles is very rich, and parties make good wages by hauling the dirt 1½ miles to the river to be washed in rockers. Mr. Bowers, while his water supply lasted, made \$100 per day. The pay dirt is all the way from 1 to 50 feet below the surface, and carries coarse gold. The largest nugget so far found weighed \$106.

The Virtue mine, Manager Buckbee, near Baker City, has just made a week's clean-up of the mill, producing over \$17,000.

## DOUGLAS COUNTY.

The Continental mine on South Myrtle creek has been sold by G. W. Crews to Louden & Hemrich of Seattle for \$12,000. Hall, Rice & Cummings have bonded their mine, adjoining the Continental, to H. H. McCarthy and G. Johnson of Portland at about \$12,000.

McCarthy & Johnson have bonded Robinson & Oatman's mine in the same district for \$10,000. Development work will be pushed on all of these mines by their new owners, work having already begun on the Continental.

## GRANT COUNTY.

The 10-stamp mill has been started on the Sanger mine, in the John Day district, near Granite. The mine is owned by Walla Walla people. Three-quarters of a million dollars have already been taken out of the Sanger, but the mine had been closed down for three years, until 1900.

## JACKSON COUNTY.

A body of high-grade ore has been uncovered at a depth of 200 feet in the Nighthawk mine, near Jacksonville. The pay shoot has a width of 12 inches. Eighty tons that milled \$75 per ton have been removed from the strike. The Nighthawk is a new proposition.

## JOSEPHINE COUNTY.

Several Foothills creek placer mines have been sold to a Seattle company, of which N. H. Latimer is the head. The transfer includes the Lance group of claims at \$35,000 and water rights, also the J. W. Short claims, adjoining, at \$4800, and it is stated that the syndicate has options on several other placer properties in that district. It is said that this syndicate pro-

poses to buy the entire mining acreage down to the forks of the creek.

## SOUTH DAKOTA.

## LAWRENCE COUNTY.

It is stated that the Portland M. Co. of Clinton, Iowa, which is operating in the Bald Mountain country, and is treating its ore in a 50-ton cyanide plant at Central City, has bonded the May & Johnson claims for \$100,000. A shoot of cyaniding ore, 5 feet thick and over 50 feet in width, has been opened up.

The Dakota M. Co. is mining near Deadwood by stripping the soil and loose earth to the depth of from 4 inches to 2 or 3 feet with plows and scrapers, exposing a solid blanket of pay ore, which is then removed by quarry work. This blanket shows over 200 feet wide and 8 to 12 feet deep, and 1400 or 1500 feet northerly and southerly across the company's ground. This ore has lain exposed to view for many years. The shafts put down were in ore as soon as they struck the solid formation, but the old miners did not know it. Their old dumps contain tons of ore that they threw out of their little shafts and left to decompose and disintegrate, not knowing what it was. The Dakota Co. has stripped the ore over a tunnel that the company had put in. From this tunnel the company is working the body by breaking it down into the tunnel, from where it is carried to the loading station and thence to the mill.

## TEXAS.

## BREWSTER COUNTY.

The quicksilver belt in Brewster county has been traced for several miles. It crosses the Rio Grande river into Mexico a few miles below Terlingua. More than 1000 mining claims have been located in the county within the year and some of them are being developed and worked extensively. Quicksilver furnaces have been erected and are in operation. California people who are interested in quicksilver mines have bought mines in this field.

## UTAH.

## DAVIS COUNTY.

At the Wandering Jew mine, near Farmington, a 7-inch streak of ore has been struck in the breast of the tunnel at a depth of 280 feet. Assays indicate 59% lead, 2.7 ounces silver and 60 cents gold per ton. W. D. Mathis of Salt Lake City is treasurer of the company.

## SALT LAKE COUNTY.

At the Dalton & Lark deep tunnel at Bingham, operated by the Bingham Con. Co., graders are making a deep cut for the Rio Grande Western spur, and work is being pushed on the new compressor and boiler buildings. The former, including machine and blacksmith shops, will be 40x80 feet in dimensions, and the latter 48x33 feet. A switch from the railroad will reach the boiler house on a trestle and dump coal directly into bins. The compressor will be 300 H. P. capacity, and be connected with the mines by a 10-inch pipe line. There will be three boilers (self-feeders) of 150 H. P. each. The tunnel is being advanced 10 feet a day and is now in 1600 feet. At the tunnel mouth is the beginning of a village which is expected to be soon made a postoffice. Manager G. Adams and J. J. Tufts of the Oquirrh-Bingham Co. have started work on the Starlus and West Mountain mines at Bingham, now belonging to the company. A small force is putting former workings of the property in order. It is said that the mines are to be operated on a large scale, which, as planned, will include the installation of hoisting and pumping machinery for sinking the Starlus main incline several hundred feet.

## SUMMIT COUNTY.

An electric motor is expected to be placed on the top floor of the Silver King mill, at Park City, at the lower terminal of the aerial tram, to run the elevators, which will take up coal and supplies to the top floor, where they will be loaded for transportation to the mine and sampler over the tram.

The Superior group of claims at Bonanza Flat, Park City, has been bonded to E. A. Saffington and associates, Eastern people, who will develop it. There has been a large amount of work done on this mine.

## TOOELE COUNTY.

The Rover, Gold Dust, Silver Lode and New Mercur mines at Mercur, it is reported, propose to consolidate, pending the closing of which the New Mercur has suspended development.

The Indian Springs M. Co. has been incorporated at Salt Lake City. F. Leak is president and R. M. Holt secretary and treasurer. The company owns the Keystone, Keystone Nos. 1 and 2, and the Brooklyn and Brooklyn Nos. 1 and 2 claims.

The Sacramento M. Co.'s mill and roasting plant at Mercur has been badly damaged by fire which started at the new

roasting plant. The plant had \$15,000 insurance on it. Manager Bothwell says it is the intention of the company to rebuild at once.

## WASHINGTON COUNTY.

The West Point C. M. Co. has been incorporated, capital \$5000, to operate eight mining claims. B. Jarvis of St. George is president and J. Keate secretary.

## FOREIGN.

## BRITISH COLUMBIA.

After four months' shut-down work has been started again in the War Eagle and the Center Star at Rossland. The pumpmen and the engineers have commenced unwatering the Center Star mine, which will take about two weeks, after which mining will commence.

The White Bear mine at Rossland is to be reopened. The theory of the White Bear owners is that the continuation of the Le Roi lead extends into their ground. Acting on this basis, a large sum of money has been expended in development and operations are now to be resumed. The main shaft is down to a depth of 350 feet, and drifts have been run for several hundred feet from the several levels.

T. Drummond, who has been in the Stillwater country since June, somewhere near the headwaters of the Horsefly, is reported to have found some extremely rich ground. He brought out forty ounces of gold to Ashcroft.

The Spitsee mine at Rossland has been closed down pending the installation of machinery of sufficient power to continue the development work. The duration of the close-down is indefinite, but it is the intention of the company to resume operations at an early date, and negotiations are under way with the West Kootenay Power & Light Co. looking to the adoption of electric power.

## MEXICO.

The Grand Central mill, at Minas Prietas, Sonora, has been started up after being closed down six months. At present but twenty stamps are used, but it is reported that the mill will work up to its full capacity as soon as miners to stope out the necessary ore are obtained. G. Kier is foreman of the mill.

At La Calera, about 48 miles east from Magdalena, Sonora, Wuench & Co., of Denver, who bought the Calera gold property from L. O. Cowan, of Tucson, Ariz., have completed and started up a 5-stamp mill on the free-milling gold ores which the mine yields.

La Dura M. Co. have commenced a new triple-compartment shaft upon their Prieto mine, near La Concentration, just west from the Yaqui river, beyond La Barranca, Sonora. The new shaft is about 1800 feet south from the old shaft on the same mine. It is to be put down 1200 feet, and is now down about 300. A big hoist is to be put on the shaft, and a building and a gallows frame are being built.

## Personal.

R. ALLISON of Ketchikan, Alaska, is in San Francisco, Cal.

DANIEL MCCARTHY is the new Supt. Granite mine, Victor, Colo.

F. A. ARTER of Cleveland, O., will leach the tailings at Silver Reef, Utah.

DUNCAN MCVICHTIE has returned from Bland, N. M., to Salt Lake City, Utah.

G. A. LONSBERRY of the Belmont mine at Washington, Ariz., is in Boston, Mass.

W. W. MILLER is now Supt. California-Idaho mine, Pike City, Sierra county, Cal.

F. J. SIEBERT has been appointed manager of the Clifford mines at Tonopah, Nev.

B. F. KELLY, manager of the Kelly tunnel at Georgetown, Colo., is in Chicago.

NOAH CLIMO has resigned the superintendency of the New England mine, Clifton, Ariz.

W. DODGE, foreman at the Princeton mine, Princeton, Cal., is sojourning in San Francisco.

EUGENE M. KIRK, assayer and electrician at the Rawhide, Cal., mine, is in San Francisco.

L. CUMMINS has returned from Calaveras, Cal., M. Co.'s property to San Francisco.

WM. J. MUSE has resigned the superintendency of the Montana Coal & Coke Co., Horr, Mont.

W. SCOTT, Supt. of the Four Black Dogs mine of Valdez, Alaska, is in Seattle, Wash.

F. L. BUTTERFIELD has been appointed manager Vivandiere mine, Turret City, Colo.

DAVID MCCLURE of the Gwin mine,

Calaveras county, Cal., has returned from a trip to Europe.

S. V. RAWLINS has been appointed master mechanic Mass Mining Co., Houghton, Mich.

W. S. GRAHAM, C. E., of Auburn, Cal., has returned from a few weeks' sojourn in Minneapolis, Minn.

PHILIP MIXSELL of Idaho Springs, Colo., is examining mining property in Nevada county, Cal.

ALEX. BURRELL, representing London investors, is examining the St. Julien gold property, Park county, Mont.

CALIFORNIA STATE MINERALOGIST AUBREY has returned to San Francisco from a reconnaissance of Shasta county, Cal.

J. AUDLEY SMITH is Supt. of the newly constructed smelter of the Boston & Seven Devils Copper Co., Weiser, Idaho.

D. G. WILLIAMS of Placerville, Cal., will be Supt. of the Placerville, Cal., slate properties recently acquired by F. S. Chadborne.

A. A. ABBOTT, late Supt. West Colusa mine, Anaconda, Mont., has resigned. He will be Supt. Holy Terror M. Co. at Keystone, S. D.

M. FONTAIN, who has been making an examination of the mines of the Clifton Con. M. Co. at Clifton, Ariz., has returned to Paris, France.

J. F. COSTELLO has been appointed manager of the Northport, Wash., smelter of the Le Roi M. Co., succeeding Manager Hussey, resigned.

J. ALLEN VEATCH, manager Darien G. M. Co., will return next January from California to the company's property, Cana, Colombia, S. A.

JOS. TAAFE succeeds Patrick Holland as foreman Allison Ranch mine, Nevada county, Cal. The latter assumes a similar position at Quartzburg, Idaho.

JOHN FORDYCE BALFOUR, of Benken, Sumatra, D. E. I., has returned to San Francisco, Cal., from Trinity county, Cal., and is en route to Scotland.

C. P. PERIN is now consulting engineer of the Mine Securities Corporation, of which Thos. J. Hurley is president, operating in Colorado and Mexico.

THOS. ELLIS JR. returned this week from Alameda, Cal., to Mina de San Francisco, Ocotlan, Oaxaca, Mexico, where he is superintending operations.

P. HOLLAND has resigned as foreman of the Allison Ranch mine, near Grass Valley, Cal., and has accepted the superintendency of a mine at Quartzburg, Idaho.

A. M. POWELL, C. E., who has been four years in Alaska surveying under the direction of Capt. W. R. Abercrombie for the Government, is sojourning at Seattle, Wash.

D. H. JACKSON, formerly of the Comstock and Candelaria, Nev., who recently returned from Nome, Alaska, will take charge of his mining property at Tonopah, Nev., next month.

J. O. HARRON, of the firm of Harron, Rickard, & McCone, successors to the Parke & Lacy Co. of San Francisco, Cal., has returned home from an extended Eastern business sojourn.

SUPT. CHITTENDEN, who will take charge of the Pioneer-Lynn G. M. Co., Placer county, Cal., has arrived at the property. Leon S. Griswold has been engaged as consulting engineer.

ALBERT LOCKLY, who held the superintendency of the Overman and Caledonia, Virginia City, Nev., mines for nearly thirty years, has resigned and will make his future residence in Oakland, Cal.

E. H. BENJAMIN, secretary California State Miners' Association, has returned to San Francisco, Cal., from attending the meeting of the American Institute of Mining Engineers in the City of Mexico.

GARDNER F. WILLIAMS of Oakland, Cal., general manager Kimberly, South Africa, diamond mines, arrived in California this week and leaves to-day for the mines, where he has supervision of 12,000 men. He says the Kimberly mines are now annually exporting about \$25,000,000 worth of precious stones.

## Obituary.

J. M. GLEAVES, U. S. Surveyor-General of California, died in San Francisco, Cal., on the 27th inst., aged 48. Deceased was long a prominent mining engineer in northern California and took a leading part in the work of conservation of the waters of the State.

## Recently Declared Mining Dividends.

|                                                                   |         |
|-------------------------------------------------------------------|---------|
| Arrow M. Co., Colo., 5 cents per share, \$54,000.....             | Nov. 29 |
| Standard M. Co., Idaho, monthly, 5 cents per share, \$25,000..... | Nov. 23 |



Latest Market Reports.

SAN FRANCISCO, Nov. 27, 1901.

**SILVER.**—Per oz., Troy: London, 25½d (standard ounce, 925 fine); New York, bar silver, 55½c (1000 fine); San Francisco, 55½c; Mexican dollars, 47c San Francisco, 44½c New York.

**COPPER.**—New York: Lake, 1 to 3 casks, \$17.25; carload lots, \$16.85; Electrolytic, 1 to 3 casks, \$16.75; carload lots, \$16.62½; Casting, 1 to 3 casks, \$16.60; carload lots, 16.50. San Francisco: 18. Mill copper plates, 20c; bars, 22@23c. London: £65 16s 3d per ton.

**LEAD.**—New York, \$4.37½; Salt Lake City, \$4.00; St. Louis, \$4.40; San Francisco \$4.90, carload lots; 5½c 1000 to 4000 lbs.; pipe 6, sheet 6½, bar 5½c; pig, \$5.25. London, £11 15s per ton=2.53 cents per lb.

**SPELTER.**—New York, \$4.20; St. Louis, \$3.75; London, £16 2s 6d per ton =3.58½ cts. per lb.; San Francisco, ton lots, 5½c; 100-lb lots, 6c.

**ANTIMONY.**—New York, Cookson's, 10c; Hallett's, 9c; San Francisco, 1000-lb. lots, 10c; 300 to 500 lbs., 11c; 100-lb. lots, 13@15c.

**IRON.**—Pittsburg, Bessemer pig, \$16.00; gray forge, \$14.00; San Francisco, bar, 2.60c per lb., 2.65c in small quantities.

**STEEL.**—Bessemer billets, Pittsburg, \$24; open hearth billets, \$26.50; San Francisco, bar, 7c to 12c per lb.

**NICKEL.**—New York, 50@60c lb.

**TIN.**—New York, pig, \$27.50; San Francisco, ton lots, 28c; 1000 lbs., 28½c; 500 lbs., 28½c; 200 lbs., 28½c; less, 29c; bar tin, 32½c.

**QUICKSILVER.**—New York, \$51.00 large lots; London, £9 2s 6d; San Francisco, local, \$48.00 flask of 7½ lbs.; Export, \$45.00.

**MAGNESIUM.**—New York, \$2.90 lb.; San Francisco, \$3.75.

**ZINC.**—San Francisco, 5½c; slab, 5½c; bar, 7c; zinc dust, N. Y., 8c.

**BABBITT METAL.**—San Francisco, No. 1, 10c.

**ALUMINUM.**—New York, No. 1, 99% pure ingots, 35c; No. 2, 90%, 30c to 35c.

**SOLDER.**—Half-and-half, 100-lb. lots, 18c; San Francisco, Plumbers', 100-lb. lots, 15.25c.

**PHOSPHORUS.**—F. o. b. New York 50@60c lb.

**ASSAY LITHARGE.**—San Francisco, 10c lb., small lots.

**FERRO-MANGANESE.**—Pittsburg, 80%, domestic, \$58.50, large lots.

**TUNGSTEN.**—New York, \$ b., 95c; San Francisco, \$1.15.

**FERRO-TUNGSTEN.**—New York, 37%, 32c; San Francisco, 65c (60%).

**POWDER.**—F. o. b. San Francisco: No 1. 70% nitro-glycerine, per lb., in carload lots, 15½c; less than one ton, 17½c. No. 1\*, 60%, carload lots, 13½c; less than one ton, 15½c. No. 1\*\* 50%, carload lots, 11½c; less than one ton, 13½c. No. 2, 40%, carload lots, 10c; less than one ton, 12c. No. 2\* 35%, carload lots, 9½c; less than one ton, 11½c. No. 2\*\* 30% carload lots, 9c; less than one ton, 11c. Black blasting powder in carload lots, minimum car 728 kegs, \$1.50 per keg; less car lots, \$2 per keg.

**CAPS.**—3x, \$5.50 per 1000; 4x, \$6.50; 5x, \$8; Lion, \$9, in lots not less than 1000.

**FUSE.**—Triple tape, \$3.60 per 1000 feet; double tape, \$3.00; single tape, \$2.65; Hemp, \$2.10; Cement No. 2, \$3.00; Cement No. 1, \$2.65, in lots of 3000 feet and up.

**CANDLE.**—Granite 6s, 16 oz., 40s., 9½c lb set; 14 oz., 40s., 8½c.

**CHEMICALS.**—Cyanide of potassium, 98%-99%, jobbing, 31½@32½c lb.; carloads, 29@30c; in 10-lb. tins, 40c; sulphuric acid, in carboys, 66% B, 2c lb.; soda ash, \$1.90 lb.; hyposulphite of soda, 2½@3c lb.; blue vitriol, 5½@6½c lb.; borax, concentrated, 7@8c lb.; chlorate of potash, 12@13c; rock sulphur, 6c; alum, \$1.90@2.00; flour sulphur, French, 2½@2½c; California refined, 1½@2c; nitric acid, in carboys, 8c lb.; caustic soda, in drums, 3@4c lb.; Cal. s. soda, bbls., \$1.00; sks, 95c lb 100 lbs.; chloride of lime, spot, \$2.50@2.60; nitrate of potash, in kegs, 8c; caustic potash, 10c in 40-lb. tins.

**OILS.**—Linseed, pure, boiled, bbl., 74c; cs., 79c; raw, bbl., 74c; cs., 78c. Deodorized Stove Gasoline, bulk, 14½c; do., cs., 20½c; 86° Gasoline, bulk, 20c; do., cs., 26c; 63° Naphtha or Benzine, deodorized, in bulk, per gal., 13½c; do., in cs., 19½c; Lard Oil, Extra Winter Strained, bbl., 75c; cs., 80c; No. 1 bbl., 50c; cs., 55c. Neatsfoot Oil, cooper's bbls., 60c; cs., 65c; No. 1 bbl., 50@52½c; cs., 55@57½c.

**COAL.**—San Francisco, coast, yard prices: Wellington, \$9; Seattle, \$7.00; Coos Bay, \$5.50; Southfield, \$9.00. Cargo lots, Eastern and foreign: Wallsend, \$8.00; Brymbo, \$7.50; Pennsylvania, hd., \$14.00; Scotch, \$8; Cumberland, \$12; Cannel, \$9.50; Welsh Anthracite, \$12.00; Rock Springs, \$8.50; Colorado Anthracite, \$14.50. Coke, \$16 per ton in bulk; \$18 in sacks.

Commercial Paragraphs.

The Atlas Pipe Wrench Co., manufacturers of the Atlas pipe wrench, are believers in expositions, as their sales of pipe wrenches show a wonderful increase in the last few months, a great deal of it due directly to the Pan-American Exposition, at which they gave a practical demonstration of the workings of the pipe wrench, and were awarded the highest medal for pipe wrenches.

New Patents.

DEWEY, STRONG & CO.'S SCIENTIFIC PRESS PATENT AGENCY, 330 Market St., S. F., has official reports of the following U. S. patents issued to Pacific coast inventors:

FOR THE WEEK ENDING NOVEMBER 19, 1901.

687,175.—LOCK—H. Barry S. F.

686,932.—HAT SHOWCASE—R. W. Brown, Colfax, Cal.

687,127.—BRACKET—J. E. Chapman, San Jose, Cal.

686,806.—EXPLOSIVE ENGINE—H. Enge, West Berkeley, Cal.

687,025.—BORING MACHINE—B. E. Hervey, Ritz, S. F.

686,851.—WEIGHING APPARATUS—G. Hoepner, S. F.

686,835.—BUCKET—E. Hutson, Oregon City, Or.

686,976.—AIR VALVE—Kelly & Hazard, Los Angeles, Cal.

687,159.—BOTTLE—D. Landau, S. F.

687,052.—WINDOW FASTENER—J. J. McCormick, S. F.

686,883.—OILER—J. D. McFarland, Jr., S. F.

686,957.—SYRINGE—J. M. Miller, Dayton, Wash.

686,825.—VEHICLE TIRE—W. Morck, Oakland, Cal.

686,951.—WELL BAILER—W. Plotts, Whittier, Cal.

686,784.—TOOTH BRUSH—C. W. Richards, S. F.

687,069.—SEAL LOCK—H. A. Rotermund, Montague, Cal.

687,100.—RAILWAY—J. N. Young, Alameda, Cal.

Notices of Recent Patents.

Among the patents recently obtained through Dewey, Strong & Co.'s SCIENTIFIC PRESS U. S. and Foreign Patent Agency, the following are worthy of special mention:

**AUTOMATIC OILING DEVICE.**—No. 686,863. Nov. 19, 1901. J. D. McFarland, Jr., San Francisco, Cal., one-half assigned to John Bruckman of same place. This device consists of a double-headed piston valve adapted to reciprocate in an oil-containing vessel, and an oil passage in the side of the valve through which the oil may pass intermittently from the vessel to the part to be lubricated. The length of the oil channel and the amount which it will thus contain is regulated so

that any given amount of oil may be periodically delivered to the part to be lubricated.

**ELASTIC VEHICLE TIRE.**—No. 686,825. Nov. 19, 1901. William Morck, Oakland, Cal., one-third assigned to George E. De Golia, same place. This invention consists in the employment of concentric rings, one forming the tread and the other located at a short distance interior thereto. Radially sliding rods extend from the outer rim through the inner, and springs surround the rods between the two rims and by their tension maintain the rims normally approximately concentric with each other. The springs are compressed by weight upon the inner rim through the spokes connecting the hub with said rim, and thus an elastic bearing is at all times in rollers or equivalent means for reducing the friction of the sliding rods are suitably connected with the rim.

**REVOLVING HAT SHOWCASE.**—No. 686,922. Nov. 19, 1901. R. W. Brown, Colfax, Cal. This invention comprises a multiple sectional containing case for hats, said sections being mounted upon a revolvable carrier and each section being independently turnable upon its own axis. The sections are provided with a plurality of peculiarly constructed supports upon which the hats are placed, so that a great number of hats may be conveniently displayed and at the same time protected from dust.

**EXPLOSIVE ENGINE.**—No. 686,806. Nov. 19, 1901. H. Enge, West Berkeley, Cal. In this engine two pistons are movable in a single cylinder and the rods of said pistons are connected with clamps that the pistons are separated on the inward stroke toward the rear end of the cylinder, and at the same time a body of explosive fluid is admitted between the pistons during this movement. Toward the end of the rearward movement the pistons approach each other and the body of explosive fluid is forced through the rear piston into the chamber at the rear end of the cylinder, where it is ignited and the explosion acts to propel the compound pistons toward the forward end of the cylinder. Means are provided for opening an exhaust passage to allow the escape of the products of combustion upon the second inward stroke, while at the same time a new charge of explosive fluid is taken between the pistons in readiness to be exploded at the proper instant. An engine thus constructed becomes what is known as a two-cycle engine, instead of a four-cycle, which is the ordinary construction of the usual gasoline engine.

**AUTOMATIC WEIGHING APPARATUS.**—No. 686,861. Nov. 19, 1901. G. Hoepner, San Francisco, Cal. Assigned to Union Sae's & Mfg. Co., of Sacramento, Cal. This invention relates to that class of apparatus which are adapted to weigh powdered and granular or similar substances and deliver them in regular quantities into such receptacles as may be desired. It consists of a plurality of scale pans adapted to receive containers into which the material is to be weighed. A beam or frame is fulcrumed and tiltable with relation to a main support upon which it is carried, and which is in turn suspended from a scale beam, so that while both have a certain movement in unison there is also an independent movement of the two. Connected with the supplemental tilting beam is an oscillating lever carrying a segment and stop at its upper end, and means by which the supported end of the supplemental beam is raised when the filled package is moved to place the apparatus in condition for again weighing.

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(—) Indicates every other week or monthly advertisements.

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| Bartlett & Co., C. O.                         | 1      |       | Lietz Co., A.             | 14 |       | Roebbling's Sons Co., John A.        | 21 |       |
| Baszanger & Co., J.                           | 9      |       | Little Belt Machinery Co. | 14 |       | Roessler & Hasselbacher Chemical Co. | 1  |       |
| Bauer Lamp & Reflector Co.                    | 1      |       | Luckhardt & Co., C. A.    | 14 |       | Rogers, E. B. & Co.                  | 1  |       |
| Becker, Christian                             | 1      |       | Lunkenheimer Co.          | 19 |       | Rosenberger, A. F.                   | 1  |       |
| Bell, Newton M.                               | 19     |       |                           |    |       |                                      |    |       |
| Benjamin, E. H.                               | 14     |       |                           |    |       |                                      |    |       |
| Best Manufacturing Co.                        | 3      |       |                           |    |       |                                      |    |       |
| Billin & Co., Chas. E.                        | 2      |       |                           |    |       |                                      |    |       |
| Boesch Lamp Co.                               | 2      |       |                           |    |       |                                      |    |       |
| Bradley Pulverizer Co.                        | 5      |       |                           |    |       |                                      |    |       |
| Brann & Co., F. W.                            | 15     |       |                           |    |       |                                      |    |       |
| Bretherton Hot Blast Smelting Co.             | 17     |       |                           |    |       |                                      |    |       |
| Broderick & Bascom Rope Co.                   | 4      |       |                           |    |       |                                      |    |       |
| Brownell, J. S.                               | 22     |       |                           |    |       |                                      |    |       |
| Bucyrus Dredge                                | 16     |       |                           |    |       |                                      |    |       |
| Bullard & Brock                               | 1      |       |                           |    |       |                                      |    |       |
| Burlingame & Co., E. E.                       | 10     |       |                           |    |       |                                      |    |       |
| Burnham-Standford Co.                         | 10     |       |                           |    |       |                                      |    |       |
| Burt Mfg. Co.                                 | 10     |       |                           |    |       |                                      |    |       |
| Burton, Howard E.                             | 14     |       |                           |    |       |                                      |    |       |
| C                                             |        |       |                           |    |       |                                      |    |       |
| California Debris Commission                  | 2      |       |                           |    |       |                                      |    |       |
| California Electrical Works                   | 2      |       |                           |    |       |                                      |    |       |
| California Perforated Screen Co.              | 1      |       |                           |    |       |                                      |    |       |
| California Portland Cement Co.                | 1      |       |                           |    |       |                                      |    |       |
| California Vigorite Powder Co.                | 1      |       |                           |    |       |                                      |    |       |
| California Wire Works                         | 22     |       |                           |    |       |                                      |    |       |
| Cameron Steam Pump Works                      | 12     |       |                           |    |       |                                      |    |       |
| Canton Steel Co.                              | 9      |       |                           |    |       |                                      |    |       |
| Cary Spring Works                             | 10     |       |                           |    |       |                                      |    |       |
| Chinn-Beretta Optical Co.                     | 10     |       |                           |    |       |                                      |    |       |
| Chrome Steel Works                            | 20     |       |                           |    |       |                                      |    |       |
| Clark Co., W. J.                              | 10     |       |                           |    |       |                                      |    |       |
| Collier, B. K.                                | 1      |       |                           |    |       |                                      |    |       |
| Colorado Iron Works Co.                       | 4, 18  |       |                           |    |       |                                      |    |       |
| Colorado Lamp Co.                             | 1      |       |                           |    |       |                                      |    |       |
| Colorado Midland Railway                      | 1      |       |                           |    |       |                                      |    |       |
| Colorado & Southern Railway                   | 10     |       |                           |    |       |                                      |    |       |
| Cooper, C. A.                                 | 10     |       |                           |    |       |                                      |    |       |
| Copper King, Ltd.                             | 22     |       |                           |    |       |                                      |    |       |
| Cory, C. L.                                   | 16     |       |                           |    |       |                                      |    |       |
| Crane Co.                                     | 16, 17 |       |                           |    |       |                                      |    |       |
| Crocker-Wheeler Co.                           | 20     |       |                           |    |       |                                      |    |       |
| Crosscup, I. O.                               | 14     |       |                           |    |       |                                      |    |       |
| Currie, J. W.                                 | 14     |       |                           |    |       |                                      |    |       |
| D                                             |        |       |                           |    |       |                                      |    |       |
| Davis Calyx Drill Co.                         | 9      |       |                           |    |       |                                      |    |       |
| Davis Iron Works Co., F. M.                   | 16     |       |                           |    |       |                                      |    |       |
| Dearborn Drug & Chemical Works                | 13     |       |                           |    |       |                                      |    |       |
| Denniston's San Francisco Plating Works       | 19     |       |                           |    |       |                                      |    |       |
| Denver Engineering Works                      | 17     |       |                           |    |       |                                      |    |       |
| Denver Fire Clay Co.                          | 1      |       |                           |    |       |                                      |    |       |
| E                                             |        |       |                           |    |       |                                      |    |       |
| Edison Manufacturing Co.                      | 2      |       |                           |    |       |                                      |    |       |
| Electric Railway & Mfgs Supply Co.            | 2      |       |                           |    |       |                                      |    |       |
| Eriasson Telephone Co.                        | 2      |       |                           |    |       |                                      |    |       |
| Eureka Co.                                    | 1      |       |                           |    |       |                                      |    |       |
| Evans & Co., C. H.                            | 1      |       |                           |    |       |                                      |    |       |
| Excelsior Redwood Co.                         | 1      |       |                           |    |       |                                      |    |       |
| F                                             |        |       |                           |    |       |                                      |    |       |
| Falkenau, Louis                               | 14     |       |                           |    |       |                                      |    |       |
| Fassett, Charles M.                           | 14     |       |                           |    |       |                                      |    |       |
| Finn, Oliver B.                               | 14     |       |                           |    |       |                                      |    |       |
| Florence & Cripple Creek Railroad Co.         | 13     |       |                           |    |       |                                      |    |       |
| For Sale                                      | 1      |       |                           |    |       |                                      |    |       |
| Fremeric & Son                                | 17     |       |                           |    |       |                                      |    |       |
| Frue Vanning Machine Co.                      | 22     |       |                           |    |       |                                      |    |       |
| Fueller, C. M.                                | 14     |       |                           |    |       |                                      |    |       |
| Fulda Tank Manufactory                        | 1      |       |                           |    |       |                                      |    |       |
| G                                             |        |       |                           |    |       |                                      |    |       |
| Garlock Packing Co.                           | 10     |       |                           |    |       |                                      |    |       |
| General Concentrates Co.                      | 15     |       |                           |    |       |                                      |    |       |
| General Electric Co.                          | 1      |       |                           |    |       |                                      |    |       |
| Globe Iron Works                              | 8      |       |                           |    |       |                                      |    |       |
| Goodyear Rubber Co.                           | 12     |       |                           |    |       |                                      |    |       |
| Gold & Silver Extraction Co. of America, Ltd. | 13     |       |                           |    |       |                                      |    |       |
| Griffin, Frank W.                             | 16     |       |                           |    |       |                                      |    |       |
| Gutta Percha Rubber & Mfg. Co.                | 1      |       |                           |    |       |                                      |    |       |
| H                                             |        |       |                           |    |       |                                      |    |       |
| Haas, Baruch & Co.                            | 13     |       |                           |    |       |                                      |    |       |
| Haff, Edward L.                               | 14     |       |                           |    |       |                                      |    |       |
| Hallidie Ropeway                              | 22     |       |                           |    |       |                                      |    |       |
| Hanks, Abbot A.                               | 14     |       |                           |    |       |                                      |    |       |
| Harrigan, Jno.                                | 14     |       |                           |    |       |                                      |    |       |
| Harrison, L. G.                               | 2      |       |                           |    |       |                                      |    |       |
| Hartay, A. E.                                 | 2      |       |                           |    |       |                                      |    |       |
| Head's Business College                       | 2      |       |                           |    |       |                                      |    |       |
| Hendrie & Bolthoff Mfg. & Supply Co.          | 21     |       |                           |    |       |                                      |    |       |
| Hendy Machine Works, Joshua                   | 21     |       |                           |    |       |                                      |    |       |
| Herche Bros.                                  | 14     |       |                           |    |       |                                      |    |       |
| Hersey, Clarence                              | 14     |       |                           |    |       |                                      |    |       |
| Hertz & Son                                   | 12     |       |                           |    |       |                                      |    |       |
| Holden, S. P.                                 | 1      |       |                           |    |       |                                      |    |       |
| Hooper & Co., Wm.                             | 1      |       |                           |    |       |                                      |    |       |
| Hoskins & Co., C.                             | 1      |       |                           |    |       |                                      |    |       |
| Hunt, A. M.                                   | 1      |       |                           |    |       |                                      |    |       |
| Huntington, F. A.                             | 13     |       |                           |    |       |                                      |    |       |
| Huntley, D. B.                                | 14     |       |                           |    |       |                                      |    |       |
| I                                             |        |       |                           |    |       |                                      |    |       |
| Ingersoll-Sergeant Drill Co.                  | 8      |       |                           |    |       |                                      |    |       |
| Irving & Co., James                           | 1      |       |                           |    |       |                                      |    |       |
| J                                             |        |       |                           |    |       |                                      |    |       |
| Jackson Drill & Mfg. Co.                      | 9      |       |                           |    |       |                                      |    |       |
| Jackson Machine Works, Byron                  | 9      |       |                           |    |       |                                      |    |       |
| Jeffrey Mfg. Co., The                         | 16     |       |                           |    |       |                                      |    |       |
| Jeanesville Iron Works Co.                    | 8      |       |                           |    |       |                                      |    |       |
| Jessop & Sons, Ltd., Wm.                      | 8      |       |                           |    |       |                                      |    |       |
| K                                             |        |       |                           |    |       |                                      |    |       |
| Kent Mill Co.                                 | 8      |       |                           |    |       |                                      |    |       |
| Keuffel & Esser Co.                           | 1      |       |                           |    |       |                                      |    |       |
| Keystone Driller Co.                          | 8      |       |                           |    |       |                                      |    |       |
| Knight & Co.                                  | 17     |       |                           |    |       |                                      |    |       |
| Krogh Mfg. Co.                                | 7      |       |                           |    |       |                                      |    |       |
| L                                             |        |       |                           |    |       |                                      |    |       |
| Larkin Mining Co.                             | 2      |       |                           |    |       |                                      |    |       |
| Leffel & Co., James                           | 12     |       |                           |    |       |                                      |    |       |
| Legg, R. G.                                   | 14     |       |                           |    |       |                                      |    |       |
| Leschen, A. & Sons                            | 17     |       |                           |    |       |                                      |    |       |
| Lewellyn Iron Works                           | 4      |       |                           |    |       |                                      |    |       |
| Leyner, J. Geo.                               | 9      |       |                           |    |       |                                      |    |       |
| Lietz Co., A.                                 | 14     |       |                           |    |       |                                      |    |       |
| Little Belt Machinery Co.                     | 14     |       |                           |    |       |                                      |    |       |
| Luckhardt & Co., C. A.                        | 14     |       |                           |    |       |                                      |    |       |
| Lunkenheimer Co.                              | 19     |       |                           |    |       |                                      |    |       |
| M                                             |        |       |                           |    |       |                                      |    |       |
| Macbeth & Co., James                          | 1      |       |                           |    |       |                                      |    |       |
| Macdonald, Bernard                            | 14     |       |                           |    |       |                                      |    |       |
| Madison, Bruce & Sellers                      | 15     |       |                           |    |       |                                      |    |       |
| Main Belting Co.                              | 14     |       |                           |    |       |                                      |    |       |
| Manning's Assay Office                        | 14     |       |                           |    |       |                                      |    |       |
| Marion Steam Shovel Co.                       | 20     |       |                           |    |       |                                      |    |       |
| Marshutz & Cantrell                           | 1      |       |                           |    |       |                                      |    |       |
| McFarlane & Co.                               | 2      |       |                           |    |       |                                      |    |       |
| Meredith, Wynn                                | 14     |       |                           |    |       |                                      |    |       |
| Merle Co., A.                                 | 17     |       |                           |    |       |                                      |    |       |
| Michigan College of Mines                     | 2      |       |                           |    |       |                                      |    |       |
| Midland Terminal Railway Co.                  | 9      |       |                           |    |       |                                      |    |       |
| Mine & Smelter Supply Co.                     | 5      |       |                           |    |       |                                      |    |       |
| Miners' Assay Office                          | 14     |       |                           |    |       |                                      |    |       |
| Mining Bureau & Real Estate Co.               | 1      |       |                           |    |       |                                      |    |       |
| "Mining Investor"                             | 2      |       |                           |    |       |                                      |    |       |
| Mohican Mining & Milling Co.                  | 9      |       |                           |    |       |                                      |    |       |
| Montague & Co., W. W.                         | 16     |       |                           |    |       |                                      |    |       |
| Morris, H. D. & H. W.                         | 20     |       |                           |    |       |                                      |    |       |
| N                                             |        |       |                           |    |       |                                      |    |       |
| National Con. Mining Co.                      | 9      |       |                           |    |       |                                      |    |       |
| National Iron Works                           | 1      |       |                           |    |       |                                      |    |       |
| Neill, James W.                               | 14     |       |                           |    |       |                                      |    |       |
| Nevada Metallurgical Works                    | 14     |       |                           |    |       |                                      |    |       |
| New Era Machinery Co.                         | 20     |       |                           |    |       |                                      |    |       |
| New Process Raw Hide Co.                      | 19     |       |                           |    |       |                                      |    |       |
| O                                             |        |       |                           |    |       |                                      |    |       |
| Ogden Assay Co.                               | 14     |       |                           |    |       |                                      |    |       |
| Oriental Gas Engine Co.                       | 1      |       |                           |    |       |                                      |    |       |
| Orleans Con. Mining Co.                       | 2      |       |                           |    |       |                                      |    |       |
| Otis, McAllister & Co.                        | 1      |       |                           |    |       |                                      |    |       |
| P                                             |        |       |                           |    |       |                                      |    |       |
| Pacific Coast Rubber Co.                      | 1      |       |                           |    |       |                                      |    |       |
| Pacific Coast Smelting & Refining Works       | 22     |       |                           |    |       |                                      |    |       |
| Pacific Engineering Co.                       | 14     |       |                           |    |       |                                      |    |       |
| Pacific Tank Co.                              | 1      |       |                           |    |       |                                      |    |       |
| Paraffine Paint Co.                           | 12     |       |                           |    |       |                                      |    |       |
| Parke & Lacy Co.                              | 22     |       |                           |    |       |                                      |    |       |
| Paul, Almarin E.                              | 14     |       |                           |    |       |                                      |    |       |
| Pennington Sons, Inc., Geo. W.                | 14     |       |                           |    |       |                                      |    |       |
| Perez, Richard A.                             | 14     |       |                           |    |       |                                      |    |       |
| Peterson, L.                                  | 1      |       |                           |    |       |                                      |    |       |
| Phillips & Co., Alvin                         | 14     |       |                           |    |       |                                      |    |       |
| Phillips Rock Drill Co.                       | 9      |       |                           |    |       |                                      |    |       |
| Phipps, W. C.                                 | 14     |       |                           |    |       |                                      |    |       |
| Pneumatic Cyanide Process Co.                 | 10     |       |                           |    |       |                                      |    |       |
| Postlethwaite, R. H.                          | 14     |       |                           |    |       |                                      |    |       |
| Powell Co., Wm.                               | 14     |       |                           |    |       |                                      |    |       |
| Prescott & Eastern Railroad                   | 10     |       |                           |    |       |                                      |    |       |
| Putnam, H. J. & Co.                           | 1      |       |                           |    |       |                                      |    |       |
| Q                                             |        |       |                           |    |       |                                      |    |       |
| Quick, Jno. W.                                | 1      |       |                           |    |       |                                      |    |       |
| R                                             |        |       |                           |    |       |                                      |    |       |
| Redington & Co.                               | 1      |       |                           |    |       |                                      |    |       |
| Rose, I. Elmer                                | 14     |       |                           |    |       |                                      |    |       |
| Rosards, J. W.                                | 14     |       |                           |    |       |                                      |    |       |
| Riesdon Iron Works                            | 14     |       |                           |    |       |                                      |    |       |
| Rix Compressed Air & Drill Co.                | 9      |       |                           |    |       |                                      |    |       |
| Robins Conveying Belt Co.                     | 1      |       |                           |    |       |                                      |    |       |
| Roebbling's Sons Co., John A.                 | 21     |       |                           |    |       |                                      |    |       |
| Roessler & Hasselbacher Chemical Co.          | 1      |       |                           |    |       |                                      |    |       |
| Rogers, E. B. & Co.                           | 1      |       |                           |    |       |                                      |    |       |
| Rosenberger, A. F.                            | 1      |       |                           |    |       |                                      |    |       |
| S                                             |        |       |                           |    |       |                                      |    |       |
| San Francisco Pioneer Screen Works            | 1      |       |                           |    |       |                                      |    |       |
| Sands & Wood                                  | 14     |       |                           |    |       |                                      |    |       |
| Sanford, Albert B.                            | 14     |       |                           |    |       |                                      |    |       |
| Santa Fe Railroad                             | 13     |       |                           |    |       |                                      |    |       |
| Schaw, Ingram, Batcher & Co.                  | 19     |       |                           |    |       |                                      |    |       |
| School of Practical Mining                    | 18     |       |                           |    |       |                                      |    |       |
| Selby Smelting & Lead Co.                     | 18     |       |                           |    |       |                                      |    |       |
| S. H. Supply Co.                              | 1      |       |                           |    |       |                                      |    |       |
| Simonds, Ernest H.                            | 14     |       |                           |    |       |                                      |    |       |
| Simonds Saw Co.                               | 18     |       |                           |    |       |                                      |    |       |
| Situations Wanted                             | 1      |       |                           |    |       |                                      |    |       |
| Smith & Co., F. L.                            | 20     |       |                           |    |       |                                      |    |       |
| Smith Co., S. S.                              | 12     |       |                           |    |       |                                      |    |       |
| Smith & Francis                               | 2      |       |                           |    |       |                                      |    |       |
| Smith & Thompson                              | 1      |       |                           |    |       |                                      |    |       |
| Smooth-On Mfg. Co.                            | 16     |       |                           |    |       |                                      |    |       |
| Standard Oil Co.                              | 9      |       |                           |    |       |                                      |    |       |
| Stevens, Ralph E.                             | 14     |       |                           |    |       |                                      |    |       |
| Stillwell-Bierce & Smith-Valle Co.            | 1      |       |                           |    |       |                                      |    |       |
| Stockton Business College                     | 1      |       |                           |    |       |                                      |    |       |
| Strout & Son, W.                              | 13     |       |                           |    |       |                                      |    |       |
| Sturtevant Mill Co.                           | 13     |       |                           |    |       |                                      |    |       |
| Sullivan Machinery Co.                        | 18     |       |                           |    |       |                                      |    |       |
| T                                             |        |       |                           |    |       |                                      |    |       |
| Taylor Iron & Steel Co.                       | 19     |       |                           |    |       |                                      |    |       |
| Taylor, John & Co.                            | 7      |       |                           |    |       |                                      |    |       |
| Taylor & Co., P. T.                           | 1      |       |                           |    |       |                                      |    |       |
| Trenton Iron Co.                              | 19     |       |                           |    |       |                                      |    |       |
| Tuilles, L. W.                                | 1      |       |                           |    |       |                                      |    |       |
| Tyler, S. W.                                  | 14     |       |                           |    |       |                                      |    |       |
| U                                             |        |       |                           |    |       |                                      |    |       |
| Union Gas Engine Co.                          | 8      |       |                           |    |       |                                      |    |       |
| Union Iron Works                              | 8      |       |                           |    |       |                                      |    |       |
| Union Photo-Engraving Co.                     | 20     |       |                           |    |       |                                      |    |       |
| V                                             |        |       |                           |    |       |                                      |    |       |
| Van Der Naillen, A.                           | 14     |       |                           |    |       |                                      |    |       |
| Van Wageningen, Theo. F.                      | 14     |       |                           |    |       |                                      |    |       |
| Vulcan Iron Works                             | 12     |       |                           |    |       |                                      |    |       |
| W                                             |        |       |                           |    |       |                                      |    |       |
| Wanted                                        | 1      |       |                           |    |       |                                      |    |       |
| Waratah Minerals Co.                          | 1      |       |                           |    |       |                                      |    |       |
| Weber Gas & Gasoline Engine Co.               | 21     |       |                           |    |       |                                      |    |       |
| Weigale                                       |        |       |                           |    |       |                                      |    |       |



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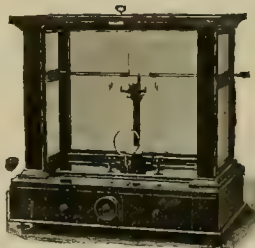
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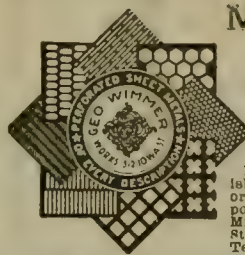
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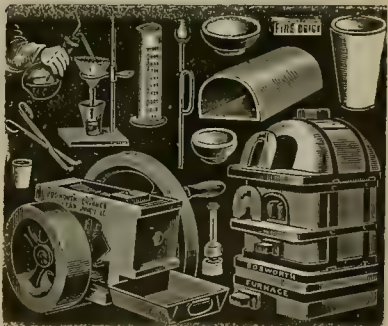
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## ASSESSMENT NOTICES.

**NATIONAL CONS. MINING COMPANY.**—Location of principal place of business, San Francisco, California; location of works, Rich Gulch, Shasta County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 16th day of November, 1901, an assessment (No. 15) of five (5) cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 773 Mission street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 26th day of December, 1901, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on THURSDAY, the 23d day of January, 1902, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.  
GEO. W. FLEISSNER, Secretary.  
Office—773 Mission street, San Francisco, California.

**ORLEANS CONSOLIDATED MINING COMPANY.**—Location of principal place of business, San Francisco, California; location of works, Grass Valley, Nevada County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 16th day of November, 1901, an assessment (No. 1) of two (2) cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 324 Pine street, Room 10, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 26th day of December, 1901, will be delinquent and advertised for sale at public auction; and unless payment is made before, will be sold on THURSDAY, the 26th day of January, 1902, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.  
GEO. P. THURSTON, Secretary.  
Office—324 Pine street, Room 10, San Francisco, California.

**LARKIN MINING COMPANY.**—Location of principal place of business, El Dorado County, California; location of works, El Dorado County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 7th day of November, 1901, an assessment (No. 1) of two cents per share was levied upon the capital stock of the corporation, payable immediately to the secretary, at the office of the company, 112 Main street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 14th day of December, 1901, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 6th day of January, 1902, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

N. P. REMINGTON, Secretary.  
Office—112 Main street, San Francisco, California.

**MOHICAN MINING & MILLING COMPANY.**—Location of principal place of business, San Francisco, California; location of works, Tuolumne County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 6th day of November, 1901, an assessment (No. 2) of five cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, No. 300 California street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 4th day of January, 1902, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 3d day of February, 1902, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.  
JNO. W. CLASSEN, Secretary.  
Office—No. 300 California street, San Francisco, California.

## DELINQUENT SALE NOTICE.

**THE YUBA CONSOLIDATED GOLD MINING COMPANY.**—Location of principal place of business, San Francisco, California; location of works, Nevada County, California.

Notice.—There are delinquent upon the following described stock on account of assessment (No. 4) levied on the 12th day of October, 1901, the several amounts set opposite the names of the respective shareholders, as follows:

| Names.                | No. Cert. | No. Shares. | Amt.    |
|-----------------------|-----------|-------------|---------|
| J. L. Bryson.....     | 99        | 1,070       | \$30 00 |
| J. L. Bryson.....     | 100       | 1,001       | 31 00   |
| Myles Pickthall.....  | 76        | 1,000       | 30 00   |
| Francesco Arata.....  | 71        | 1,000       | 30 00   |
| F. Arata.....         | 80        | 1,000       | 30 00   |
| Charles Grondona..... | 74        | 1,000       | 30 00   |
| James Grondona.....   | 75        | 1,070       | 30 00   |

And in accordance with law, and an order from the Board of Directors, made on the 12th day of October, 1901, so many shares of each parcel of such stock as may be necessary, will be sold at public auction at the office of E. W. Morris, room 104, ninth floor, Crocker Building, corner of Post and Market streets, San Francisco, California, on MONDAY, the 16th day of December, 1901, at the hour of 1 o'clock P. M. of said day, to pay said delinquent assessment thereon, together with costs of advertising and expenses of sale.

EDWARD H. STEARNS, Secretary.  
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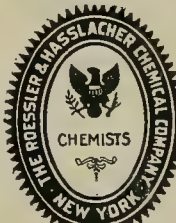
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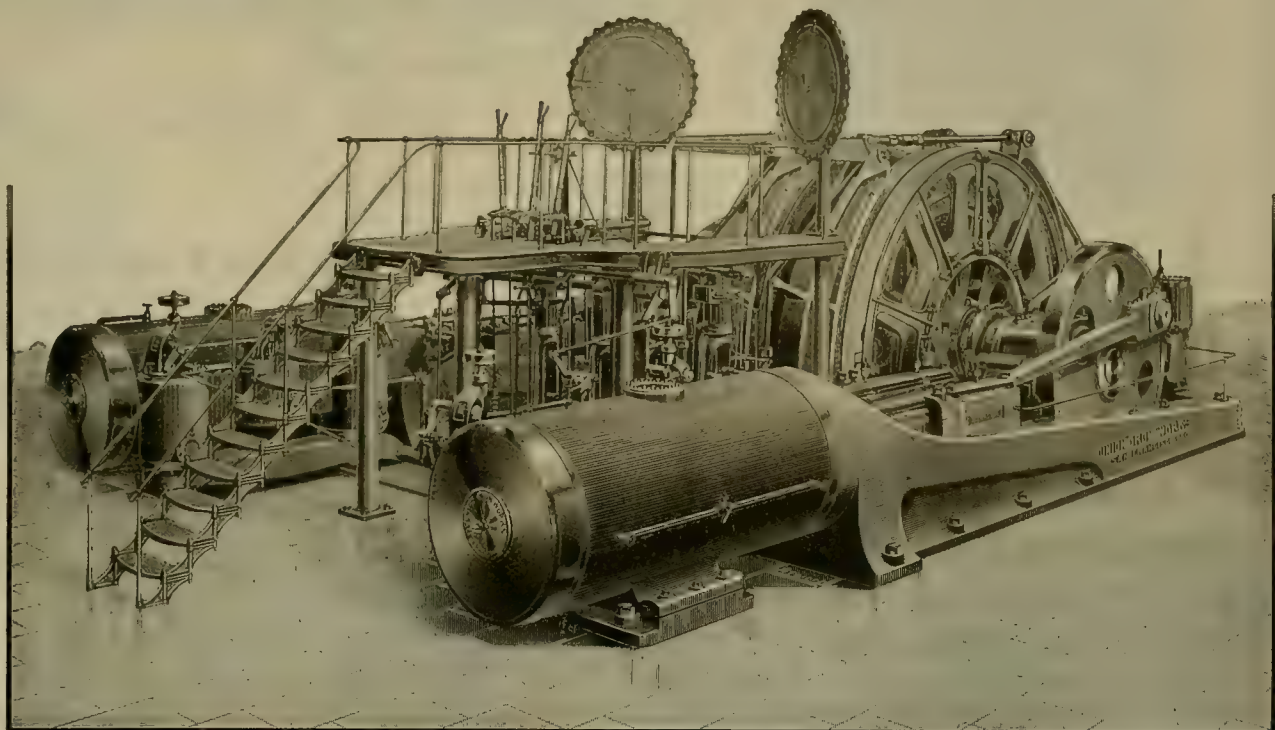
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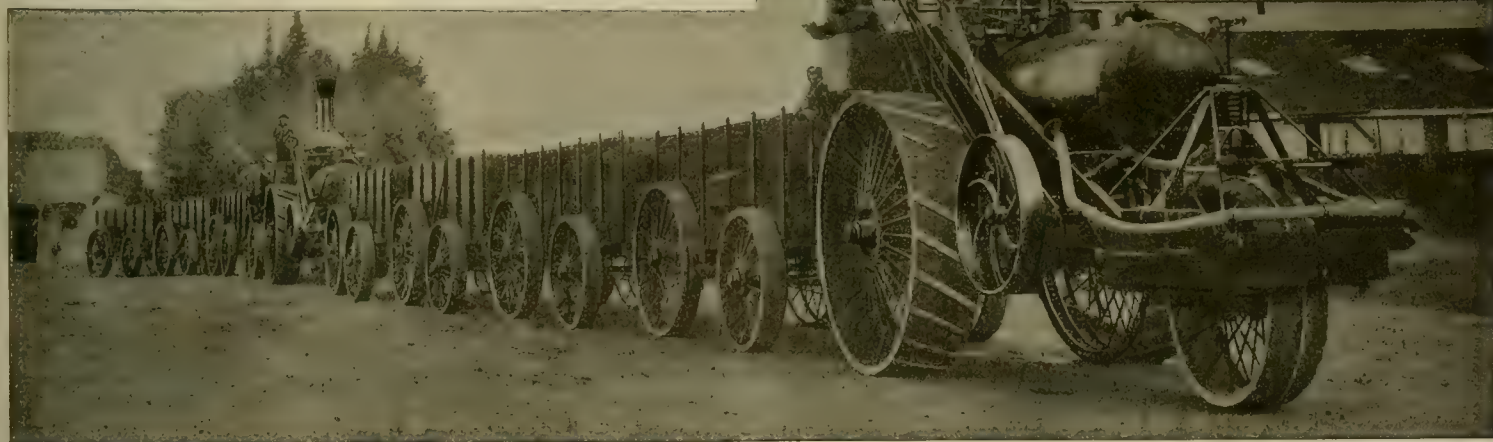


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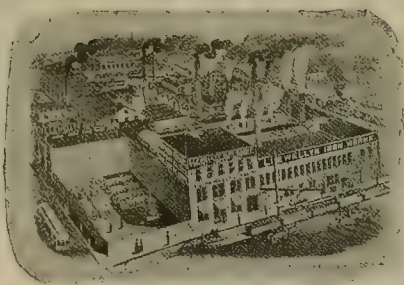
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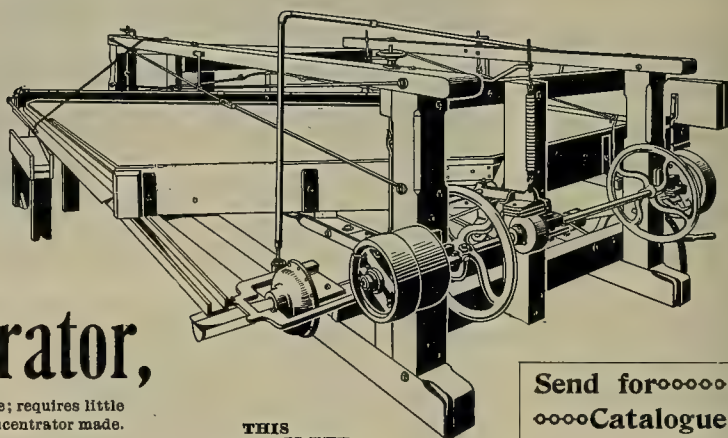
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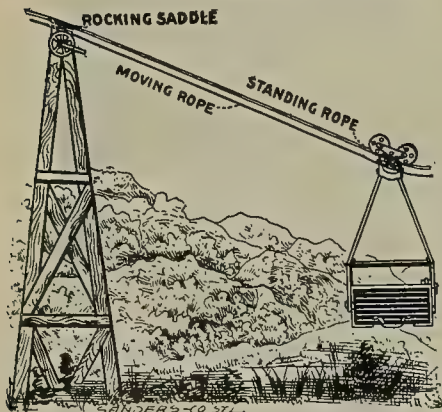
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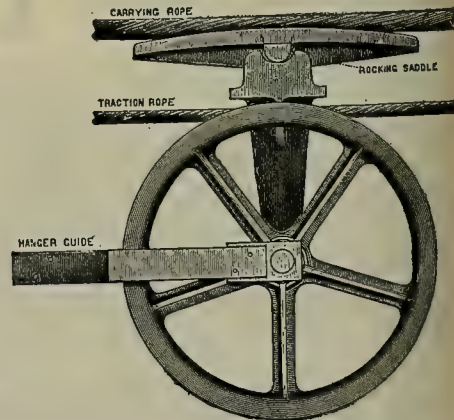
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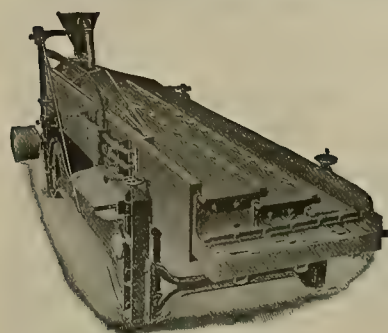
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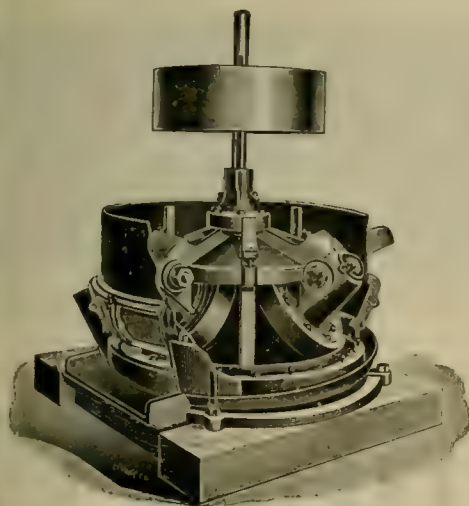
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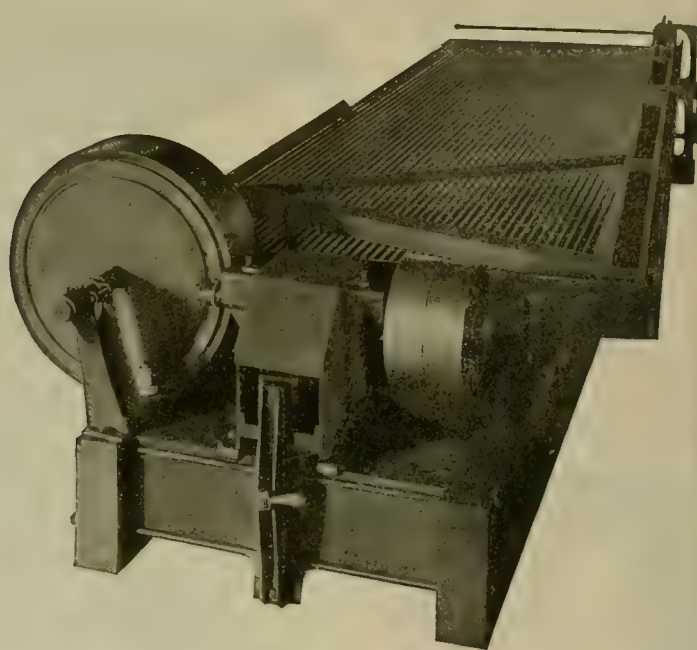
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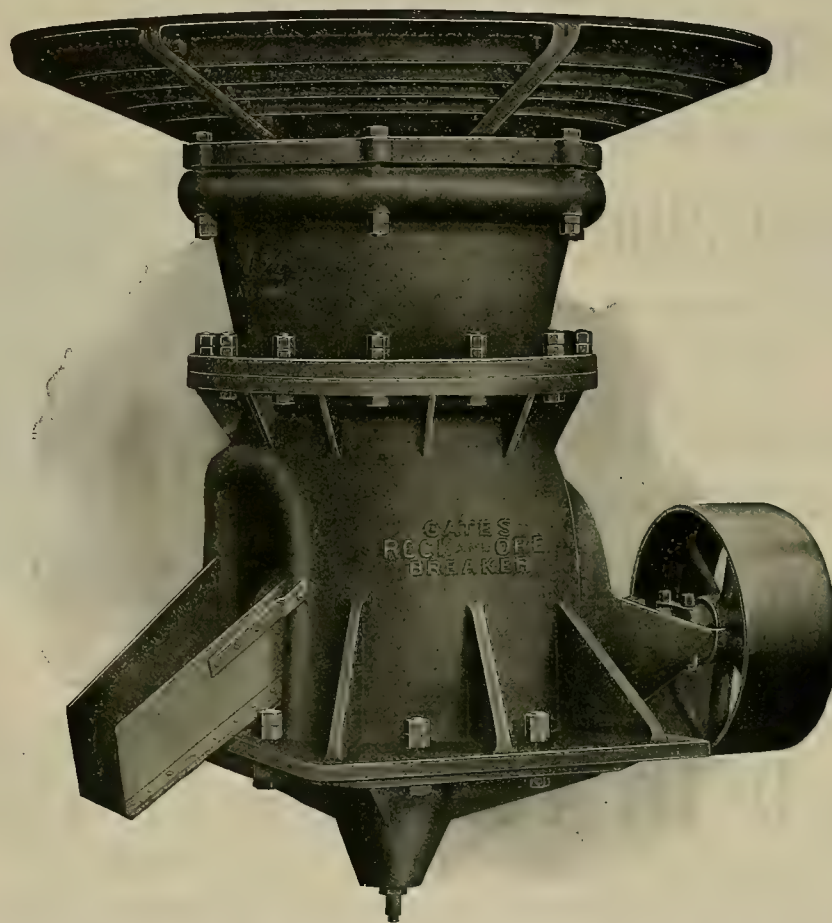
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the adjustable and practically indestructible GATES ROCK AND ORE BREAKERS produce crushed material at a much lower cost per ton than other breakers. To more than 5,000 users located in all parts of the world, the cause is readily apparent. Gates Breakers not only have much greater capacity, require less power, run without vibration, stoppage or delay, with less wear on the crushing surfaces and permitting carloads of material to be dumped directly into the hopper of breaker, thus reducing the employment of handling devices and manual labor to the minimum, but other convincing reasons supported by indisputable evidence of the superiority of Gates Breakers are given in Gates Catalogue No. 1. Avoid a false start and possibility of failure. There is absolutely no breaker made that will compare with the "Gates."

We are prepared to build crushing plants complete, screens and perforated metal of all kinds, elevators, hoists, engines, and boilers. We also build cement machinery of the latest designs. ESTIMATES FURNISHED UPON APPLICATION.

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Cable: "Risdon's."

MANUFACTURERS OF

Code: A. B. C. & Leiber's.

Gold Dredging Machinery

And COMPLETE EQUIPMENT for Placer Mines OUR SPECIALTY.

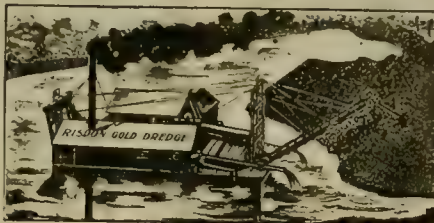
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GOLD DREDGES Complete in Running Order

to handle 2500 cubic yards per day at a cost of 3 cents per cubic yard.

We excavate 50 feet below water, 20 feet above water and handle boulders up to one ton weight.

SEND FOR DREDGING CATALOGUE NO. 17.



—WE ALSO BUILD—

ALL KINDS OF

Mining, Milling, Concentrating,
Pumping, Air Compressing,
Hydraulic, Water Wheel,
and Hoisting Machinery.

Evans Hydraulic Gravel Elevators.

—We publish sixteen catalogues. Write for one in the line you are interested in.—

THE RISDON HAMMERED SHOES AND DIES.



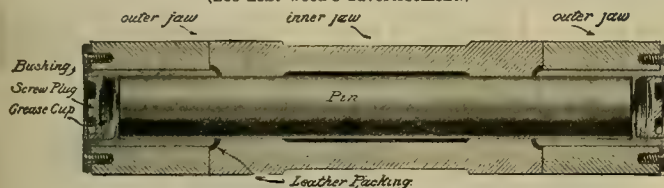
Manufactured from the best quality of projectile steel—which is stronger and tougher than any heretofore used—the best shoe and die ever made. Will crush more ore per pound of steel than any other. Will not chip or cup and will outlast any other made. Wear smooth and true with hardly any perceptible decrease in their size, and those who use them say, "We never had shoes and dies wear so long." Send for circulars and dimension blanks to



RISDON IRON WORKS, San Francisco, Cal.

That celebrated GRIT-PROOF ARTICULATION!

(See next week's advertisement.)



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USED IN THE DREDGE CHAIN MADE BY THE

Link-Belt Machinery Co., CHICAGO, U. S. A.

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MODERN MINING MACHINERY.

QUARTZ MILLS of any capacity,
IN UNITS OF TWO AND FIVE STAMPS.

Acme Amalgamators for Beach Sands
and other placer mining. Successfully applied to quartz mills in
addition to or displacing plates.

SUCCESSFUL GRAVEL MILL RECENTLY IMPROVED.

Special Gold Dredging Pumps and Machinery. Concentrators,
Feeders, Rock Breakers and Power Plants.

Largest manufacturers of Irrigation and Reclamation Pumps in the
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No. 25, Mining.

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CENTRIFUGAL PUMPS

—FOR—

Mine Draining or Hydraulicking.

WE DESIGN PUMPS FOR ALL CONDITIONS.

WRITE FOR CATALOGUE.



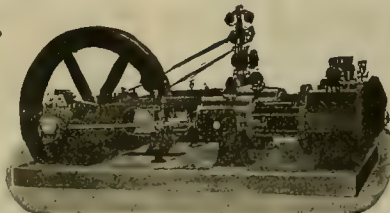
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LIDLAW-DUNN-GORDON CO.'S "Cincinnati" Air Compressors

ALL TYPES AND SIZES.

Atlas, Corliss,
Plain and
Automatic
Engines and
Boilers.

Mining and
Milling
Machinery.



Worthington
Pumping
Machinery.

Otis Hoists.

Heavy Forge,
Foundry and
Machine Work.

WE CARRY THE LARGEST STOCK OF MACHINERY IN THE SOUTH-
WEST FOR IMMEDIATE DELIVERY.

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Cable Address, "Alta." Codes, Western Union and Postal Directory.

JOHN TAYLOR & CO.,

63 First Street, SAN FRANCISCO, CALIF.

—IMPORTERS AND DEALERS IN—

Assayers' and Laboratory
Supplies,

Mine and Mill Supplies,

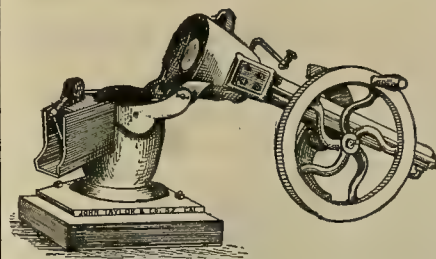
Chemicals and Chemical Glassware,
Merck's and Adamson's C. P.
Chemicals,

Cyanide of Potassium and Zinc Shav-
ings, all Balances of Standard Makes,
School and Philosophical Apparatus a
Specialty.

Our Specialties: Portable One-Stamp Mill.
Hand and Power Rock Crusher.
Combined Coal Oil and Gasoline Burner for
Assay Furnaces.

Scientific and Technical Books.

Catalogue on Application.



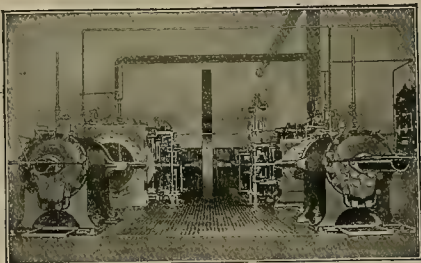
The above cut represents our Portable One-Stamp Mill
opened for cleaning, or to take apart for transportation. It
can be run by hand or belted for power.

Total weight of mill.....405 lbs.
" " upper half.....205 "
" " lower half.....200 "
Price \$100. Write for special illustrated circular.

AIR COMPRESSORS

Illustrating Cross-Compound Condensing Corliss Air Compressor in successful use at the Aurora mine, Ironwood, Mich.

A High Duty Compressor; Maximum of Power at Minimum of Cost. Designed for Mining and Underground Work.

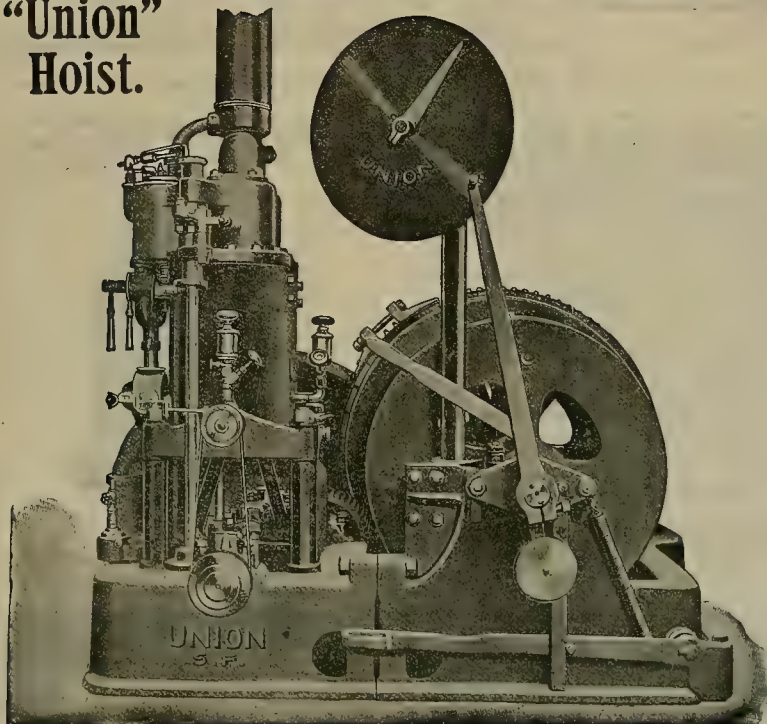


We make 40 styles; 300 sizes. Send for catalogue describing all in detail

The **INGERSOLL-SERGEANT** Drill Company

26 CORTLANDT STREET, NEW YORK
21-23 Fremont St., San Francisco, Cal. 227 South West Temple, Salt Lake City, Utah

"Union" Hoist.



The above illustrates the 25 H. P. double cylinder, single drum "Union" hoist, with all the latest improvements.

THE UNION GAS ENGINE CO.

— BUILD THE —

"Union" Gas Engines,

Which use either MANUFACTURED or NATURAL GAS, ORDINARY STOVE GASOLINE (NAPHTHA or BENZINE), DISTILLATE or KEROSENE.

STATIONARY ENGINES for All Kinds of Work in Sizes from 3 to 300 h. p. in actual use

"UNION" COMBINED HOISTS in Sizes from 3 to 130 h. p. in actual use.

"UNION" COMBINED COMPRESSORS—30, 30, 40 h. p.

HOISTS and COMPRESSORS Can Be Built in Larger Sizes to Order.

"UNION" MARINE ENGINES, 4 to 300 h. p., of Single, Double and Four-Cylinder Types.

FIFTEEN YEARS' EXPERIENCE Building Gas and Oil Engines.

"UNION" ENGINES Are In Use All Over the United States.

"UNION" ENGINES Are Simple, Durable and Economical.

Office, 248 First Street. Works, Corner First and Clementina Streets. SAN FRANCISCO, CAL.



Prospecting Machinery.

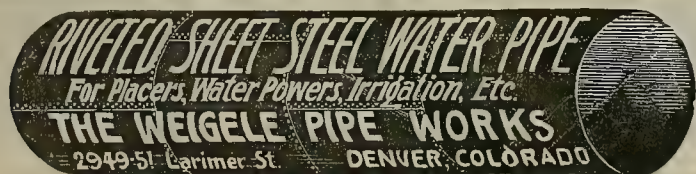
Multitudes in use for testing for minerals. Sizes and equipments to suit any and all conditions. Unexcelled for Placer Testing, Oil Wells, Water Wells, testing for Lead and Zinc, Iron and Coal; goes through anything; brings up everything. Large sizes drill as much as 1500 feet. In use all over the world. Every purchaser pleased. Used on boats for testing river and lake beds. Water no hindrance. No skilled labor required.

KEYSTONE DRILLER CO., Beaver Falls, Pa., U. S. A.

Are You Confronted With a Difficult Ore-Separating Problem?

THE WETHERILL MAGNETIC SEPARATING PROCESS

may prove the solution. Apply to Wetherill Separating Company, 52 Broadway, N. Y.



EXPERT TESTIMONY.

You need not rely wholly upon our word as to the superiority of Jeanesville Pumps.

We have letters in proof of our claims from engineers all over the world, the testimony of experts—men who understand mine pumping and practical mining machinery. Some of them are probably well known to you.

We will gladly send copies of their letters if you have any doubt of the merit of Jeanesville Pumps.

We claim that in Jeanesville Pumps is embodied the most practical combination of simplicity, accessibility, steam economy, capacity and durability. In a word, that they are the best obtainable.

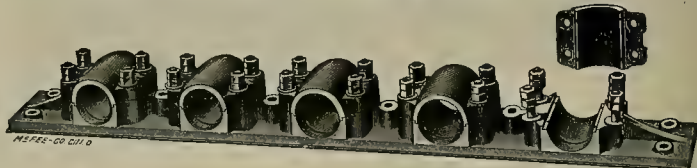
JEANESVILLE IRON WORKS CO.,
JEANESVILLE, PA.

DENVER OFFICE,
1328 SEVENTEENTH ST.



Globe Battery Stem Guide.

PATENTED AUGUST 24, 1897.



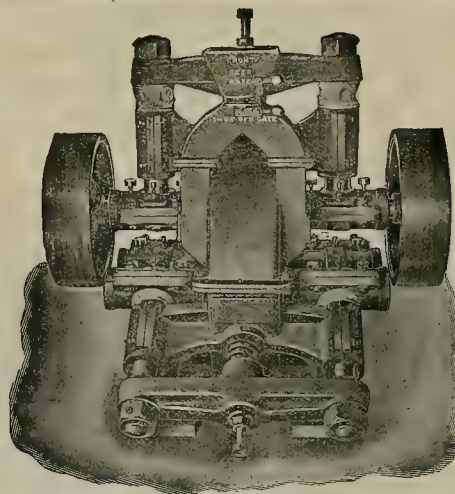
RIGID, SIMPLE, DURABLE, EFFICIENT, ECONOMICAL.

No trouble to install. No keys or wedges to adjust. No alteration of mill necessary. Effect a saving in friction losses. Each stem can be removed independent of the others. Costs no more than wooden guides.

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GLOBE IRON WORKS, Stockton, Cal.

We Build the Truax Automatic Ore Cars.



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KENT DRY PULVERIZER.

Reduces the hardest ores, and makes best product for any treatment.

Combines best wearing qualities, economy of power and great capacity.

Runs 24 hours every day without stoppage for oiling, adjustment or repairs. Shipped as shown, ready to run.

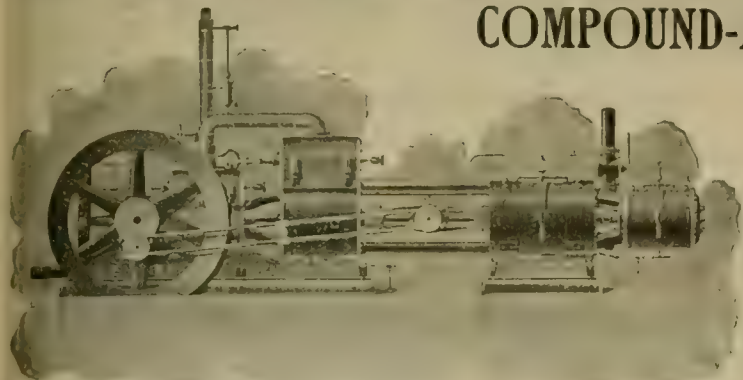
Guaranteed for 1 Year.

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DEWEY, STRONG & CO., Patent Solicitors, 330 Market St., San Francisco, Cal.

WE ILLUSTRATE HERE ONE OF OUR NEW

TANDEM, STRAIGHT-LINE, COMPOUND-STEAM, COMPOUND-AIR COMPRESSORS,



FOR WHICH WE CLAIM
Highest Economy in Fuel Consumption,
Highest Efficiency in Service,
Smallest Requirement of Floor Space,
Lowest Cost of Foundation and Installation.

AIR COMPRESSORS
BUILT ESPECIALLY FOR
MINING WORK.

SIMPLE OR COMPOUND-STEAM
COMPRESSORS. WATER-
POWER OR ELECTRIC DRIVEN.

STRAIGHT-LINE AND UPRIGHT
TYPES. BELT-DRIVEN.
SINGLE OR DUPLEX.

LOW PRESSURE COMPRESSORS
FOR PNEUMATIC CYANIDE
TREATMENT OF ORES.

J. GEO. LEYNER,

OFFICE, 729 SEVENTEENTH STREET.
WORKS, COR. 36th AND WAZEE STS.

Denver, Colo.

THE CORE'S THE THING!

LARGER CORES, GIVING ABSOLUTE RECORDS IN THE
MINIMUM TIME, ARE SECURED BY USING THE

DAVIS CALYX DRILL

FOR ALL TEST BORINGS IN EARTH OR ROCK. NO
EXPENSIVE DIAMONDS TO BUY OR LOSE.

"CORE DRILLING WITHOUT DIAMONDS" SENT FREE
ON REQUEST--ASK FOR IT.

DAVIS CALYX DRILL COMPANY,

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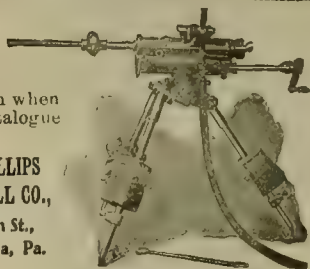
85 CEDAR STREET.

THE "NEW BADGER" ROCK DRILL

Repair bills are reduced to a minimum when
the "New Badger" Drill is used. Our catalogue
will save you money.



THE PHILLIPS
ROCK DRILL CO.,
42 N. 7th St.,
Philadelphia, Pa.



RIX COMPRESSED AIR & DRILL CO. NORTH STAR STEEL BABY DRILL.

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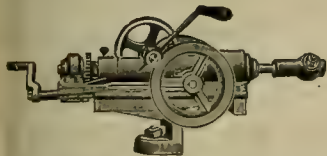
Rock Drills, Air Compressors, Mining Hoists, and Pumps for Compressed Air.
Corliss Engines, Boilers, and Steam Appliances.

ALSO AGENTS FOR LAIDLAW-DUNN-GORDEN COMPRESSORS.

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THE NEW JACKSON HAND POWER ROCK DRILL.

NOT AN EXPERIMENT; IN GENERAL USE THROUGHOUT THE WORLD

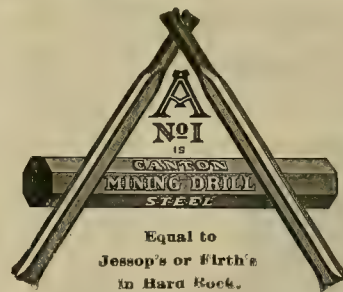


Made of Steel. Guaranteed against
breakage for two years.

H. D. CRIPPEN, Sole Manufacturer,
NEW YORK, DENVER, COLO.
52 Broadway. 1756 Larimer St.

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If you require a high grade steel possessing toughness and
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Equal to
Jessop's or Firth's
in Hard Rock.

CANTON BRANDS.

THEY HAVE NO EQUAL FOR
Hard Rock Mining.

SCHAW, INGRAM, BATCHER & CO., HARPER & REYNOLDS CO.,
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FIRTH'S DRILL STEEL.

USE THE BEST.

Has no equal in Hard Rock Drilling.

ABNER DOBLE COMPANY, GEN. AGTS.,
FREMONT AND HOWARD STS, SAN FRANCISCO.

Sold by Seattle Hardware Co., Seattle, Wash.

TO SECURE
GOOD
RESULTS
BUY

JESSOP'S STEEL

FOR TOOLS, MINING DRILLS, ETC.

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Wm. Jessop & Sons, Ltd.
Manufactory, Sheffield, England.

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SULPHURIC ACID

MANUFACTURED BY
THE WESTERN CHEMICAL CO.
DENVER, COLO.

For Chlorination, Refining and
chemically pure Acids and Ammonia are guaranteed perfect.

DIAMOND

For Prospecting Mineral
Lands and Veins.
Take out a solid core giv-
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material penetrated.
Machines for any depths,
and for steam, com-
pressed Air, Hand or
Horse Power.

Send for Catalogue.

AMERICAN DIAMOND ROCK DRILL CO.,
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J. BASZANGER & CO.,



108 Fulton St.

N. Y. CITY.

Established 1837.

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21 Maiden Lane, - NEW YORK



CRIPPLE CREEK SHORT LINE.

THE MIDLAND TERMINAL RAILWAY COMPANY.

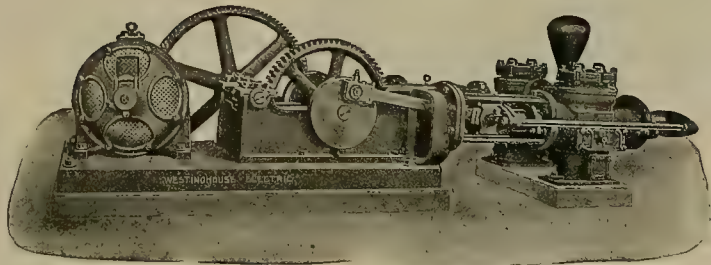
Sixty miles shorter than any other line operating
between Denver and Colorado Springs
and Cripple Creek.

Three Daily Trains Each Way Between These
Points. Through Pullman Sleepers.

W. E. GILLET, President.

L. R. FORD, Gen'l Freight & Pass. Agt.

Westinghouse Induction Motors



Westinghouse Induction Motor Driving Mine Pump.

Controlled by a Switch placed
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No commutator. Sparkless. Require no previous
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Sales Offices in all Principal Cities in U. S. and Canada.

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ore is almost
19% copper.
100 tons daily.
& reverberatory
blast furnaces,

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development,
line, consists in
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... residents to have the local
... since and Surveyor General's office at Sitka
changed to Juneau. The prayer of the petitioners is
refused, principally on the ground of economy to the
Government. The difference in office rent is \$250 a year
in favor of Sitka.

It is difficult to determine just which is "the banner
town of the country for subscriptions to the MINING
AND SCIENTIFIC PRESS." Probably Tonopah, Nevada,
comes as near the top of the list in this respect as any.
Out of a population of 750, there are 110 paid subscrip-
tions. Since July 1, 1901, the names of 617 new sub-
scribers have been received from various parts of this
west half of America.

THE general course of the price of silver has been
downward since the beginning of the year, when it was
64 cents. In April it was 58½ cents and at the present
time is 58 cents. The production in the United States
is not changed much during the last ten years. In
1900 330,000 troy ounces: in 1901

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From the Mining and Scientific Press, October 12, 1901.

THE KLONDIKE OF ARIZONA.

THE Prescott AND Eastern Railroad

ENTERS AN

Extremely Rich Mining Country.

The opening of this road makes easy of access
one of the richest Gold and Copper Mining Dis-
tricts in the World. Hundreds of prospectors are
turning their attention to this section.
Take the Santa Fe System to Ash Fork, thence
via the SANTA FE, PRESCOTT & PHOENIX RY.
to Prescott. This latter road also reaches Wicken-
burg, where is located the great Vulture Gold
Mine and where the recent marvelous gold strike
was made in the Oro Grande.
For further information and descriptive litera-
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Agt., PRESCOTT, ARIZ.

COLORADO'S GOLD

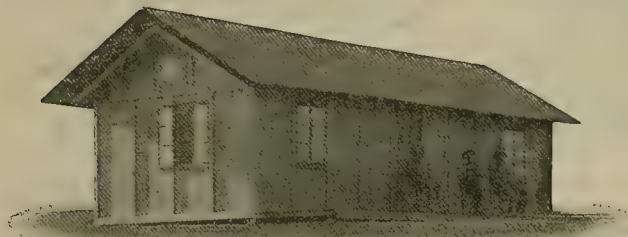
Output for 1900 is unequalled by any State in the
Union. Cripple Creek, Leadville, and all the im-
portant mining towns are reached by

THE COLORADO & SOUTHERN RY...

For copies of our publications on the Blue River and
Swandyke Gold Districts, or our pamphlet "Hints to
Prospectors," address

T. E. FISHER, GEN. PASS. AGT.,
DENVER, COLO.

Portable Houses.



SIZE 12 FT. 10½ IN. BY 31 FT. 5 IN.

BURNHAM-STANDEFORD CO.,

Washington Street bet. First and Second Streets,

SAN FRANCISCO OFFICE,

40 New Montgomery Street.

OAKLAND, CAL.

SEND FOR CATALOGUE.

THIS house
is similar
to the last one
shown, but
with supple-
mentary roof
for hot cli-
mates. The
roof can be
extended over
one or both
sides to form
a porch.

Gable win-
dows in all our
houses are
covered with
galvanized
wire screen.

Weight, 9000
pounds.

What Do You Need

■ that should be made of plate steel or iron? We make
■ anything wanted in that line. Send sketch or blue print
■ for delivered price. Boxes, Buckets, Tubs, Tanks,
■ Troughs, Pans, etc. Perhaps it is Elevator Buckets for
■ Coal, Ore, etc. We have the largest and best equipped
■ plant in the world for such and we make more Elevator
■ Buckets of one kind and another than any other and
■ probably as many as all other makers. Try us for prices
■ and character of work.

THE W. J. CLARK CO., Salem, Ohio, U. S. A.



Do you want a "Good Thing?"

If so, USE

GARLOCK PACKING.

It is the Engineer's Friend.

None genuine without this



BRANCH FACTORIES: **SAN FRANCISCO, 537 Mission St.**
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MINE BELL SIGNALS.

Adopted, Used and in Force in Accord-
ance with Law.

We print in legal size, 12x36 inches, the Mine Bell Signals and Rules provided for in the Voorhies Act
passed by the California Legislature. The law is entitled "An Act to Establish a Uniform System of Bell
Signals to Be Used in All Mines Operated in the State of California, for the Protection of Miners." We
furnish these Signals and Rules, printed on cloth so as to withstand dampness. 50 Cents a Copy.

MINING AND SCIENTIFIC PRESS, 330 Market St., San Francisco, Cal.

CARY SPRING WORKS,

240 & 242 WEST 29th STREET, NEW YORK, U. S. A.

Telephone, 3346-38th St.

**WIRE
SPRINGS**
OF EVERY DESCRIPTION.

MUSIC BOX AND FINE SPRINGS OUR SPECIALTY.

"PNEUMATIC" CYANIDE PROCESS.

(Patented in U. S., So. African Republic, New Zealand, Victoria, New So. Wales, So. Australia.)



WILL DO IN 7 HOURS WHAT REQUIRES FROM 2 TO 6 DAYS BY OLDER METHODS.
SEND FOR PAMPHLET.

THE PNEUMATIC CYANIDE PROCESS CO., 306 Boston Bldg., Denver, Colo.

DEWEY, STRONG & CO., Patent Solicitors, 330 Market St., San Francisco, Cal.



NORTHERN VERTICAL MOTOR,
INCLOSED TYPE.

Northern Motors

can be belted, geared, or direct-connected to the machine to be driven. They are suited for work in many places where it would be difficult, if not impossible, to operate other motors. They are compact and symmetrical in design. The vertical type illustrated here will undoubtedly find a large use in

MINING AND MILLING ...WORK...

We solicit correspondence with mining engineers regarding any equipment, either Direct or Alternating Current. Ask for Bulletin 324.

Northern Electrical Manufacturing Co.
MADISON, WIS.

Hendrie & Bolthoff M'f'g & Supply Co.
District Sales Managers. DENVER, COLO.



PROPELLER PUMP.

THE MAP SHOWS--

The shaded part shows that where the most metal mining is done the MINING AND SCIENTIFIC PRESS has the largest part of its circulation. It tells its own story. The MINING AND SCIENTIFIC PRESS is the only mining paper that has a general circulation therein.

Every advertiser in the MINING AND SCIENTIFIC PRESS, whether he pays for an inch or a page, knows that he weekly talks to the men who do the buying. He knows his audience just as sure as though he could look into their faces or shake hands with them. He knows that his announcement is weekly seen by the men throughout this west half of America who are thoroughly representative of the great metal mining industry of the country.

The readers of this paper have bought mining machinery and supplies to the extent of over \$150,000,000 in the last ten years, and their annual purchases now exceed \$18,000,000. Its advertising pages are referred to everywhere by intending purchasers of mining machinery or supplies as a directory for that purpose. The paper refuses questionable advertising, and its thousands of readers learned long ago, to their satisfaction, that the appearance of an advertisement in its columns is of itself good

evidence of reliability. An advertiser in this paper is in good company.

In advertising, results are what count. It is not what an advertisement costs, but what it produces, that determines its value. Leading concerns

who continuously buy advertising space herein, say that it is not an experiment, but a profitable investment to advertise in the MINING AND SCIENTIFIC PRESS. Its rates, comparatively, are "cheaper" than those of any other similar publication. "Cheapness" is not regulated by what you pay, but by what you get for what you pay. Advertising in this paper, if properly backed up by what is advertised, insures profitable publicity.

The region shaded on the map has a POPULATION OF TEN MILLIONS --- MINING IS ITS CHIEF INDUSTRY.

No advertiser who sells to mining men would omit using this journal if he knew the truth about it.

If from any reason anyone thinks "Advertising doesn't pay," we would like to furnish him with evidence that the right kind of advertising does pay. Economy in advertising is like economy in everything else—judicious expenditure of money. The results of an advertisement are what determines its value.



MINING AND SCIENTIFIC PRESS,
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Paint

P & B Paint enters the pores of wood, stone, concrete and metal readily—it penetrates and preserves—checks decay—prevents the ravages of ants and other insects—it resists fire—is elastic and is never injured by heat nor cold—will not run, crack nor scale.

Black in color—requires no heating, stirring or mixing—all ready to use and anyone can apply it. For foundation posts and pile work—in fact, underground work of all kinds.

Enables roofs, sheds and all buildings to withstand the heat, cold, moistures, fumes, etc.

Send for booklet—address Dept. A.

Paraffine Paint Co
116 Battery St. San Francisco

JOHN WIGMORE & SONS CO., HEAVY HARDWARE. Construction and Equipment Supplies. MACHINERY.

Engineers and Contractors, LOS ANGELES, CAL.



OUR SPECIALTIES ARE:
Hammered Steel Shoes and Dies,
Cam, Crank and Steamboat Shafts,
Rock-Breaker Plates,
Connecting Rods, Well-Boring Tools,
General Blacksmithing.

Correspondence Solicited, and Circulars Mailed Upon Request.
GEO. W. PENNINGTON SONS, INC.
313 Folsom Street, San Francisco, Cal.

"CRACK PROOF"

PURE RUBBER BOOTS are the Cheapest because They are the Most Durable.
BEWARE OF IMITATIONS.

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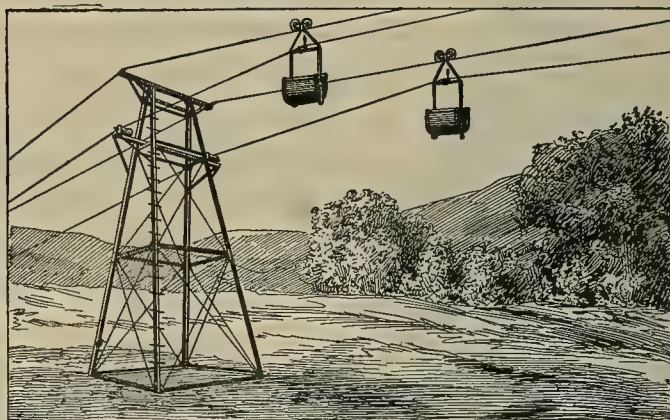
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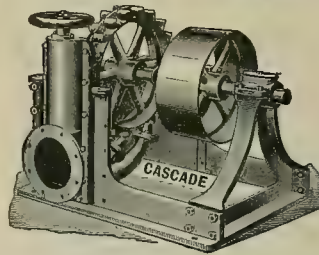
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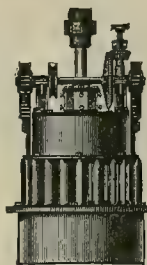
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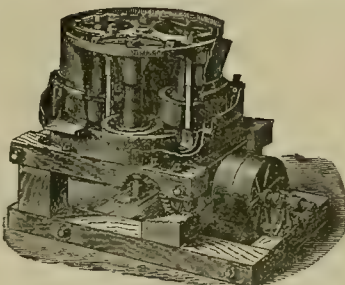
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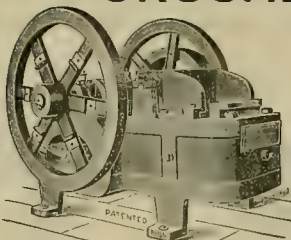
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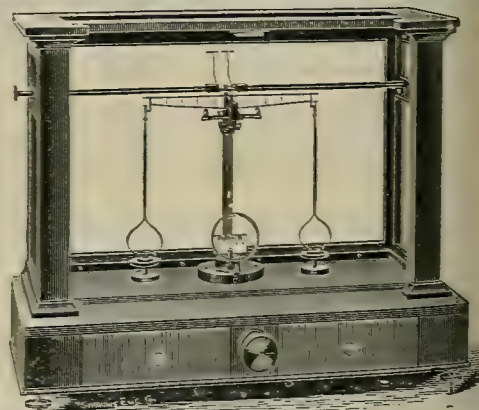
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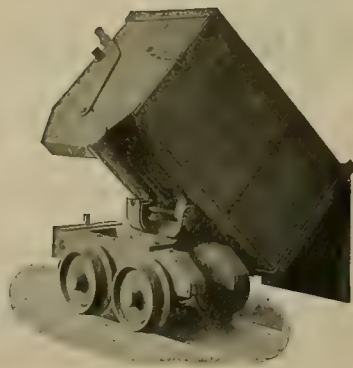
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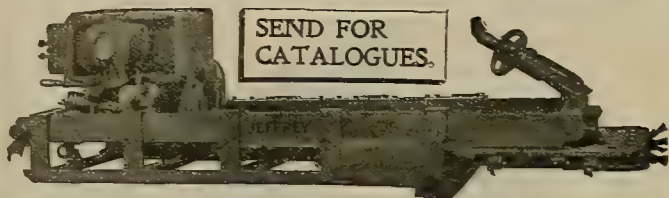
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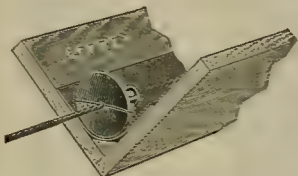
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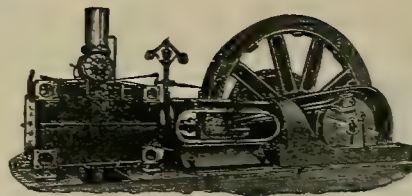
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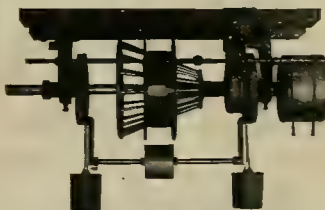
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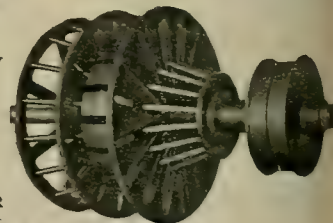
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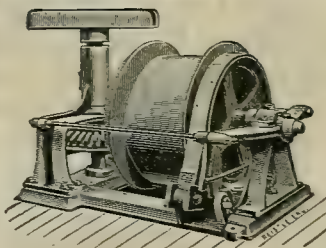
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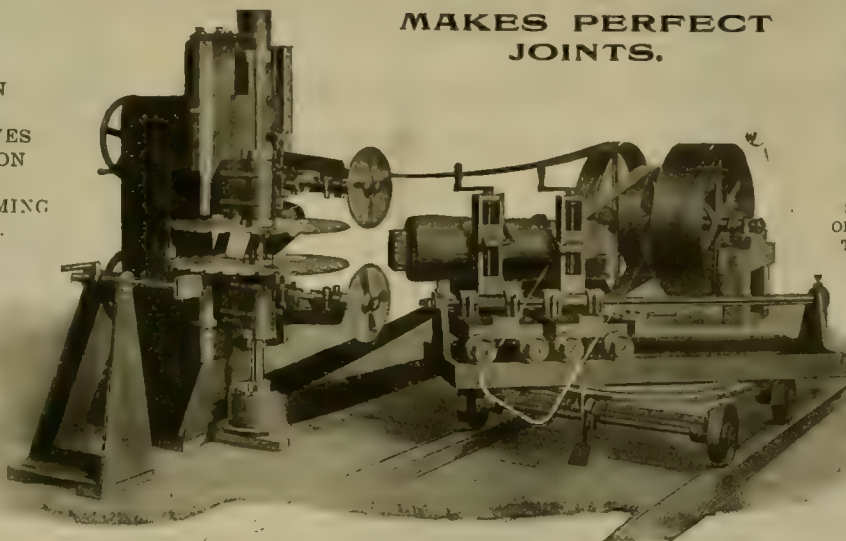
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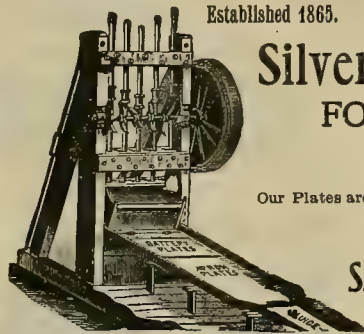
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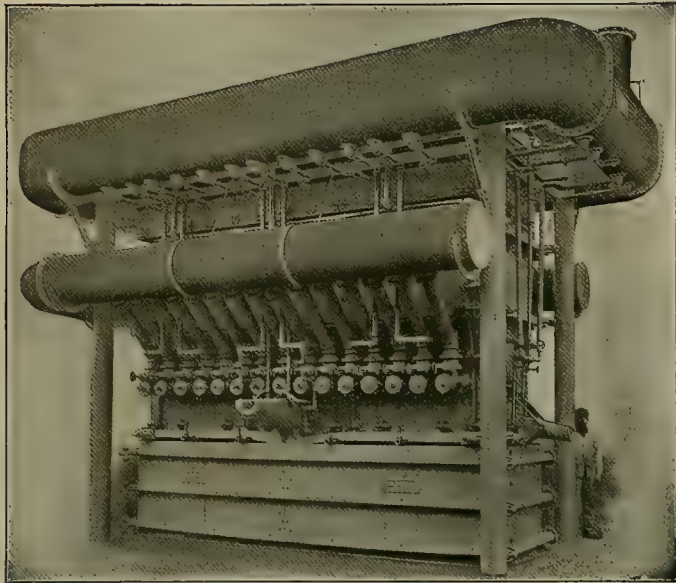
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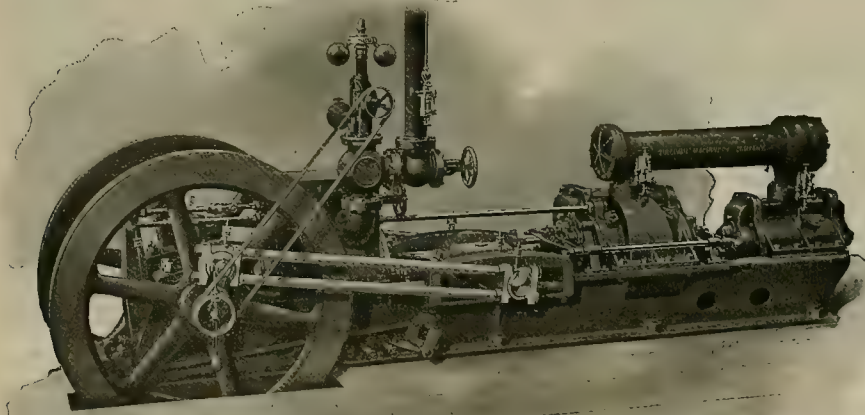
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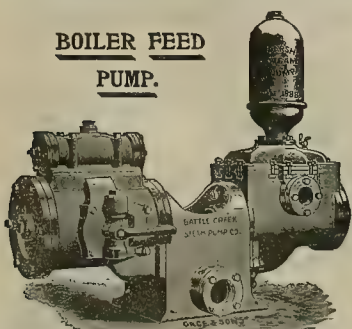
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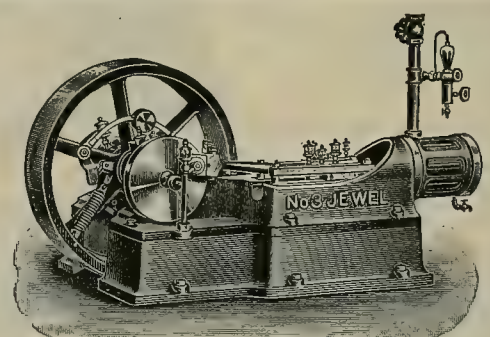
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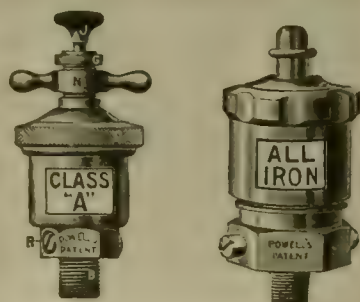
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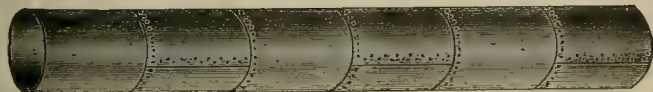
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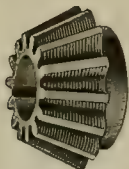
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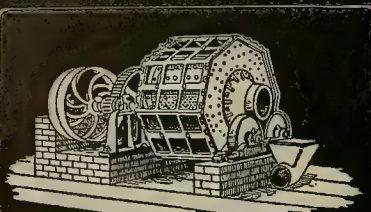
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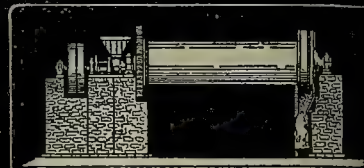
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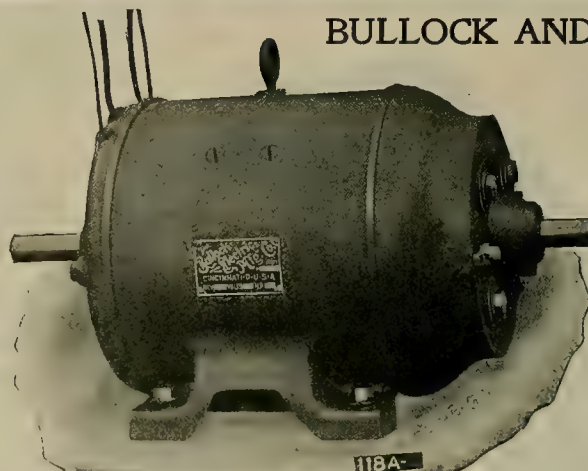
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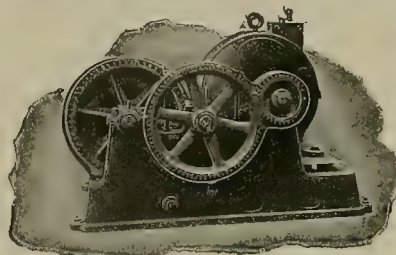
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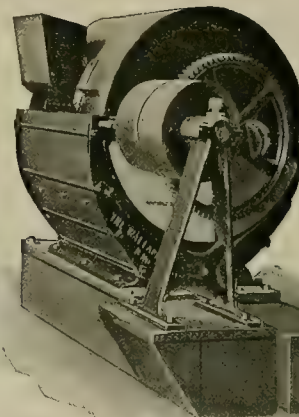
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Daily Nelson Miner.

NELSON, BRITISH COLUMBIA, WEDNESDAY, OCTOBER 30, 1901

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Thomas W. N. Hilliard, agent of
the Canada General Electric Co., is
in the city on route from Sault Ste.
Marie, Mr. Hilliard has been at
the Payne mine for several days,
where he has been installing two
Durkee electric drills. The initial
trial, Mr. Hilliard says, were very
satisfactory. A hole of 43 inches in
depth was drilled by one of the drills
in 1½ minutes. Each of the drills
is driven by two horse power while it
takes 15 horse power to furnish power
for a drill driven by compressed air at
the same altitude at which the Payne
mine is situated. It remains to be
seen, however, whether the cost of
maintenance of the electric drills will
be greater than the air drills and it
will take a month or two to fully
ascertain this. Mr. Hilliard says that
as far as he could judge from the
work of the drills that they are just
what is needed for the Slocan
which is not nearly so hard as the
rock in the Slocan mine and they
ought not to do as well in the latter.
The drills are of the Durkee pattern.
The dynamo which drives each drill
is placed a few feet away from the
drill and the power is communicated
by a flexible shaft. The makers of
the drill claim that it is the most
flexible machine on the market and
that it is especially effective in tunnel
work. The drill is fastened to the
crammer the same as the ordinary air
drill and in many ways it resembles
the latter. The makers claim that it
is the most economical drill in use.

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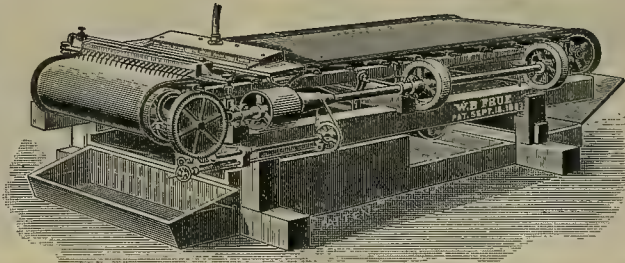
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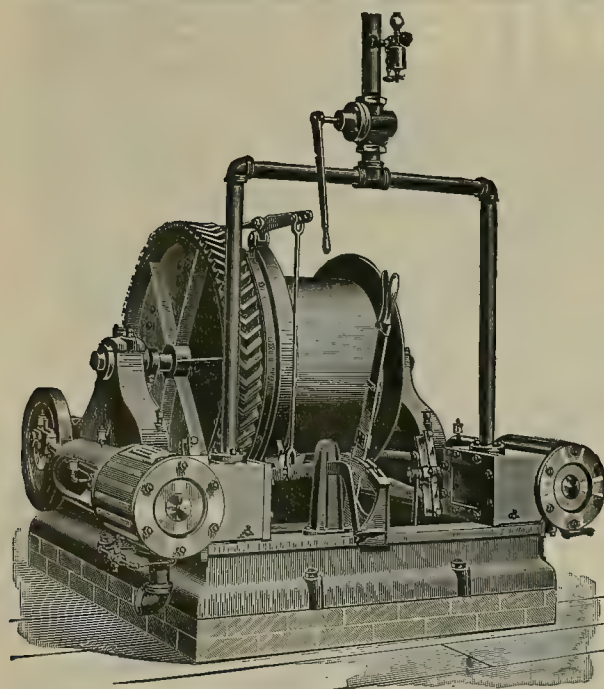


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MINING AND SCIENTIFIC PRESS.

Whole No. 2159.—VOLUME LXXXIII.
Number 23.

SAN FRANCISCO, SATURDAY, DECEMBER 7, 1901.

THREE DOLLARS PER ANNUM.
Single Copies, Ten Cents.

Mine Tunnels.

The art of construction of horizontal mine openings, tunnels, adits, levels, gangways, galleries and drifts is deficient in descriptive and technical books which are close enough up to the most advanced mining practice to be text-books for students or reference books for practical mining men. There is much that is written and appearing from time to time in current technical publications, recording the facts and expressing some of the deductions from the facts, of certain special constructions of tunnels that is valuable for the engineering student and useful to

full size and the mechanical structure required to make the large opening safe and permanent. The heading is treated as a minor detail. The construction being temporary, its detail as compared with the full structure is both technically and commercially subordinate. With the metal miner, whose mine openings are limited to about the dimensions of the railroad tunnel heading, it is the detail of the latter that is important. Works on railroad tunneling, admirable for the use of railroad engineers and builders, thus fail to meet the requirements of the miner.

In mine tunneling, including in the one word all the

made possible changes in the general construction practice, the knowledge of which is not general nor, it might be added, generalized. For example, the old practice was to make the cross-sections of the tunnel as small as possible, on the theory that it was economical of both labor and powder. Now it is found that, with power drills and a cheaper and better explosive, a comparatively large cross-section is the cheaper. The question of grade, which was formerly left very much to the disposition of the miners on the particular works, is now looked into very closely, in order to get the maximum of efficiency by the proper balancing of the load on the



Aztec Turquoise Mine, Wallapai Mining District, Mohave County, Arizona.—(See Page 246.)

the miner engaged in similar work. These occasional publications which, from the form and place in which they appear, may become forgotten and lost sight of, are excellent material for such a text and reference book as is here suggested. It is not to be inferred that current publications will supply all the data. It is the mass of minor but exceedingly necessary practical detail, the knowledge of which is erroneously assumed to be possessed by every engineering student and miner, that is particularly wanted to connect and explain the data which from its novelty is written up and published.

Works on railway tunneling very largely miss the statement of the data and fail to discuss the portion of the work that would be of practical value to the miner. Railway tunnels are large openings, and to railroad engineers the novel features are those connected with the enlargement of the heading to the

horizontal mine openings, changes in practice of construction have been frequently made during the past twenty-five years.

The change in the character of explosives, from black powder to dynamite, made possible a reduction in the labor of hand drilling and a considerable cheapening of costs. The development of compressed air drills, and later of electric power drills, have made possible further improvements in practice and lowering of costs. Meanwhile the invention of practical hand-power drills has reduced the gap between the work of the old hand methods and the new power methods. The handling of the broken out spoil, originally a very subordinate detail, has by the improvement in other details become in its turn the principal reducible item.

All these improvements in details of work have

power of incoming empty cars and outgoing loaded cars.

The problem of mine tunneling, as a whole, is the obtaining of lower average costs, and a lessened average of time used for the unit of work. In this it does not differ from any of the other separate parts of the business of mining. Having, however, received much less study, and having less complete records of practice, there is an opportunity for the presentation of a text-book or several text and reference books on the subject which would be valuable. It is ever surprising to those who do know something of an art that there is an enormous demand for information on the subordinate details of that art. The inquiries that come to this paper for information as to details of mine tunneling are numerous. They fairly indicate how much the book on mine tunneling is needed.

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San Francisco, December 7, 1901.

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THE increased consumption of silver by China, as a result of the exploitation of its resources by foreign capital, is largely—and for the time almost entirely—offset by the cost of the opening up of the country. The debt which China is to pay as a result of the late war, being payable in this country and in Europe, is paid by exchange, which reduces the amount of silver that is shipped to China. The amount of the indemnity is \$334,000,000 gold, on which interest at 4%—\$13,360,000 gold—is paid. This sum paid by exchange will cut just that much off of the value of silver export to China. It is probable that the discounting of this a year ahead is one of the causes of the recent drop in the price.

THERE is an opportunity for a reform in the U. S. Land Department through an act of Congress increasing the maximum compensation allowed Deputy Surveyors for surveying the public lands. These rates were fixed many years ago when rates of wages were low and for surveys made in the Mississippi valley lands where the work is light. At no time were the maximum rates a reasonable compensation for rough mountain lands, and they are ridiculously inadequate now and should be increased. The physical impossibility of doing first-class work for the sums paid has in the past been the excuse for very much bad work in these surveys throughout the West. It has cost the Government in the end much larger sums to rectify some of this work than it would have paid out at a fair rate for doing it correctly in the first place.

THE percentage of profit that should be considered a standard for mining investments has not been established as a commercial law. The tendency of investors is toward making the figure too low. The circumstances under which anything less than 10% per annum should be considered as the basis of an investment are so exceptional that it is safe to consider that there are no such circumstances. Fifteen per cent per annum is, as a rule, reasonable. The laws of averages and means are doubtfully applicable to such problems. It is safer to disregard them. Each mining enterprise must be considered on its own merits. Conditions in mining rarely duplicate themselves in different mines. Where 15%, reasonably to be anticipated as the earning on one mining investment, would make it desirable on that basis, another mining investment that offered 20% might be less desirable. The prospective life of the mine is an element that must not be neglected; neither must the prospective market price of the metal it yields.

Mountain Roads.

A paper on mountain roads, by James W. Abbott, which is appearing in this journal, is an instructive discussion of a subject which is of economic importance to the mining industry. Generally mountain roads are built for mines and nothing but mines and the industrial interests directly dependent on them. The importance and money-saving value of properly constructed roads, to farming, has been recognized for years, and a great deal of valuable work has been done toward securing them. The recognition of the money-saving value of good roads to mining has been slower of development.

For mining, the unavoidable mountain road building has generally been wanted for use in a hurry, and has been frequently built by the first teamsters, who, to save time, took the lines and grades of the pack trails. The actual mountain roads for miners, particularly the early-built ones, have thus been almost anything except the kind of construction which Mr. Abbott recommends. Later practice is much better and there are many examples of well built roads in the older mining districts.

Mr. Abbott's suggestions for mountain road construction are excellent. It would seem, though, that the particular suggestion he makes relative to the use of dry-stone retaining walls is subject to some modification in localities with favoring climatic conditions and when the wall is not built to hold loose slide material. In California and Arizona dry-stone retaining walls are a common detail of construction, particularly in the crossing of sharp gulches and ravines. They have there been found as a rule a safe and satisfactory construction. The walls are sometimes made as high at the center as 20 feet, and they are built as a general rule nearly vertical. Water is allowed to flow across the roadway and fall over the face of the wall. The writer recalls at the moment no instance of a failure of such a construction. Such dry wall construction would seem to be safe and practical in regions where there is little or no frost and ice. Where the winter frost and ice is considerable, as in the Rocky mountain States, the construction of dry wall only where indispensable, and then with a batter slope less than one horizontal to two vertical, is the rule that it would be unsafe to neglect.

The Making of Gold.

In this issue on page 244 appears a contribution by Edward Booth entitled, "Can Gold Be Made Artificially?" It is a serious, dispassionate discussion of the question suggested by the claims made by the late Professor Wynne of Denver, Colo., that he had discovered the secret of making gold artificially. It will be noted that Mr. Booth expresses the conclusions of the most advanced chemical research, when he says that we can be by no means assured that in the elements, as we know them, we have determined the original constituents of matter. The elements as we now define them may be compounds. Ultimately we may resolve them into their constituents. But as he also points out there is a great improbability of this being done in the sense that the gold "manufacturers" make their claims. The new elements, into which our later successful chemistry has broken up some of the supposed elements, are very closely allied physically and chemically with the so-called old elements of which they were part. It is notable that these new elements were impurities in the old ones, making mixtures with them. Finding them did not displace the known old element and take it out of the list. It merely added new ones that, by reason of imperfection of methods of investigation, had been overlooked. It is true that in the case of argon the five new elements which have been recognized in it all contributed to the physical and chemical definition of argon as it was first supposedly isolated, but the identification of the five was the splitting up of a mixture, not the breaking down of a chemical compound. The general popular idea has been quite the contrary. It is this popular idea that Mr. Booth's paper is designed to correct.

It would be desirable to have the co-operation of the daily press in correcting popular misinformation on such questions. Their tendency

seems, as a whole, to be the other way. The wilder and more improbable the fairy tale the more space and serious attention the tale seems to receive. The writers of the stuff take no responsibility for the popular opinion it moulds and are swift to condemn and consign to their oblivion the tales of the fakir when the public wants a new spice for discussion.

THE California State Railroad Commission, rehearing the petroleum oil rate cases, have rendered a decision reducing the rates from Kern, Cal., to San Francisco and other California points about 11%. The switching charges against which complaint was made have on the rehearing been cut down 50%, though on the original hearing they were not reduced. The effect of the order of the Commission reduces the carload rate \$10.35 from Oil City, Cal., to San Francisco. The opinion in the case is a clearly written logical argument. It is notable in that its reasoning is based solely on the cost to the railroad of the particular service, the transportation of the oil from the wells to points of use. The Commission has ignored, as irrelevant and immaterial, the mass of testimony put before it as to freight charges on other commodities between the same points or other points. Accepting the outside statements of the railroad companies themselves as to the cost of the service, and basing the rate they order on it, the only possible question that could now be raised by the railroads would be as to the reasonableness of the profit margin the order allows. This the Commission in its formal opinion says is 44%. This percentage is greater than the average earning of all its freight traffic as shown by the annual statements of operation of the roads. The last opinion and order of the Commission is in form and substance an improvement on the one it replaces. It not only improves the condition of the petroleum industry to the extent of the reduction, but its method of reaching conclusions establishes a precedent under which the Commission can examine intelligently into freight charges made on other commodities and can correct them when proved inequitable. The way would seem clearly opened for securing to the miners of California an equitable, fair establishment of freight rates on ores, in which there is much inequality. The railroads running out of Cripple Creek, Colo., have recently on their own initiative put into effect flat rates on ore independent of its commodity value. There is no logical reason why this should not be the established rule in California. The California Railroad Commission would have to reverse its own precedent in ordering into effect rates based on values of metal contents.

THE U. S. Supreme Court decision in the Philippine case making exports from the United States to the islands free of tariff, is, until Congress establishes a tariff, which it has the right to make under the Porto Rico decision, an opportunity for the development of the mineral resources of the island. The Pacific coast is most favorably situated to take advantage of this opportunity. Mining tools, machinery and special supplies are not in stock in the islands and the opening and working of mines is at a disadvantage in consequence. Sufficient is already known of what the metal mines of the islands are to make possible the intelligent selection of mine supply stocks. The tariff of high extra costs of mining plant and supplies does not delay or prevent their introduction into a new mining country during periods of popular excitement and misinformation as to the richness of the mines, but when such periods are past and mining, like everything else, is conducted as a business, extra costs of plant and supplies do delay and prevent their introduction as commercial stock. There is no illusion as to what Philippine island mines are, and every advantage should be taken, which, in reducing costs of plant and supplies, adds to the possibilities of profit.

ARIZONA has sufficient population and property value to become the forty-sixth State of the Union. Eastern Congressmen point to Nevada as an example of arrested development, and maintain that the same thing may happen to Arizona. This is unfair to both of those mining commonwealths. Nevada is attracting renewed attention, and as her mineral resources are developed will increase in population. Arizona will never have less population than it has to-day.

Concentrates.

WATER absorbs more heat than any other liquid, due to the fact that it contains no carbon.

THE principal requirement in moving air economically is to keep pressures and velocities low.

IN Montana hoists, flat wire rope, about $\frac{1}{4}$ inch thick and 6 to 8 inches wide, is mostly in use.

THE watt equals 44.26 foot-pounds of energy, or it is the work done in lifting 44.26 pounds weight 1 foot.

PLATINUM has been found associated with chrome iron in Siberia on the eastern slope of the Ural mountains.

AMONG several simultaneous inventors exclusive ownership rests with the one who first receives the patent.

IN a case of dispute of ownership over an unpatented mining claim, the burden of proof is always on the jumper.

PLUMBAGO, or graphite, practically pure, is made artificially at Niagara Falls, N. Y., in an electric furnace. The raw material is coke powder.

WHERE the end lines of a mining claim have been established they remain the end lines as to all veins found within the surface boundaries.

IT is permissible to do two years' assessment work on unpatented mining claims, "at one time," by doing half the work this month and the other half next month.

IN running a survey in an easterly or westerly direction in the northern hemisphere a line always bears to the south as a result of the convergence of meridians.

AT the Hidden Treasure placer gold mine, Placer Co., Cal., the mine is lighted by electricity, and the gravel handled by electric power generated solely by the mine drainage water.

A COAL BUNKER 30 feet wide at the top, 31 feet wide at the middle, 27 feet wide at the bottom, 18 feet long, 20 feet deep, will hold 702.7 tons of coal, allowing 45 cubic feet to the ton.

INQUIRIES for asbestos deposits and for the mineral are becoming numerous. Prospectors who have deposits of this mineral will find the present time an opportunity to interest capital.

THE number of alloys that can be made is innumerable. It is believed that of all that have been made not more than 200 have so far been found valuable and useful. Unquestionably many more that will be useful will be found.

ALL concrete is more or less porous, and if absolute water tightness is required a layer of waterproof material, such as asphalt or petroleum wax, must be used, or the wall must be given some coating which will fill the pores.

FOR the ten months ending with October, 1901, imports of silver into the United States were \$25,561,660, and exports \$26,225,618. Net exports were only \$663,958, so that practically all of this year's domestic production of silver remains in the United States.

CONCRETE LINING 2 feet thick is to replace the timbering in two tunnels on the Great Northern Railroad near Helena, Mont. The reduction made in the cost of cement has made it economical to make this change of construction practice for railroad tunnels.

THE United States Land Office including the Cripple Creek, Colo., district has made a ruling in an adverse claim case between conflicting locations near Cripple Creek that neither was entitled to the disputed ground, both claimants having been guilty of laches.

IT is estimated that, using all precautions, in boring with a diamond drill in rock having a hardness of seven, about one carat of diamond is lost for every 15 feet bored. The cost of the diamonds ranging from \$15 to \$70 a carat gives a range of cost per foot from \$1 to \$4.66.

IDAHO placer miners in Camas Cove mining district, which includes the Tyson placer mines, have a contest with timber scrippers for the lands started. The latter are employing the same kind of tactics used by the scripper to gain possession of the petroleum bearing lands in California.

THE report of the State Mine Inspector, who investigated the recent accident at the Smuggler-Union mine, Telluride, Colo., by which twenty-five men lost their lives, says the fatalities appear to have resulted from a failure on the part of those present to realize the danger until it was too late to avert it.

THE mere fact that an inventor is, at the time of his invention, in the employ of the Government, does not transfer to it any title or interest therein. There is no difference between the Government and any other employer in this respect, this general rule being subject to limitations only in case of public necessity.

THE air flasks that hold the compressed air under several thousand pounds pressure have been rapidly evolved during the last few years, so that now are produced in this country nickel steel flasks, not only twice the strength of those formerly used, but which are absolutely incapable of rupturing under the pressure used.

EVERY new mining law instead of settling the right of property simply increases litigation. Colorado devotes fifty pages of its statutes dictating how mining locations shall be made and maintained, but litigation over mining

claims in that great mining commonwealth is more common than in California or in any State that has no special statutes regulating locations.

VARYING the grade of the matte by feeding the furnace at different heights varies the slag composition as to its silica and iron contents, and makes the feeder the real metallurgist. The reducing action in the furnace is effected almost entirely by the gases, and when these are allowed to go to waste, reduction ceases.

MACHINES to automatically weigh gold coin are in regular use in some Eastern banks. The gold coins are accepted at weight by the banks there and the machine, to which they are fed through a hopper, sorts the coins and weighs them, returning the full weight coins to one compartment and the underweight coins to another.

TO GET 5 effective H. P. from 20 inches of water would require that the water should have a fall of 100 feet or a head of 100 feet. To use such a head would require a tangential wheel with the water striking the buckets with 100 feet of pressure. An overshot water wheel would have to be considerably over 100 feet in diameter to give the 5 H. P. from 20 inches of water.

THE chrome iron deposits in California are largely pockets in serpentine country rock. The mining of them is very uncertain. The pocket may be a few hundred pounds or as many tons. So far there is little commercial value in the mining. It has only paid wages to miners. Uses are, however, extending, and these California deposits are among the principal ones in the United States.

THE Institution of Civil Engineers, the Institution of Mechanical Engineers, the Institution of Naval Architects and the Iron and Steel Institute have formed a committee, including Sir B. Baker, Sir J. W. Barry, Sir F. Bramwell and others, which has been going thoroughly into the question of the standardization of iron and steel with a view of forming a permanent standards committee for Great Britain.

THE Supreme Court of California in the case of Reese et al. vs. the Bald Mountain Con. G. M. Co. established the rule that when a mine is operated under a bond or lease the workmen cannot hold the mine for their unpaid wages by virtue of a lien, even when there is no notice disclaiming responsibility on the part of the owners. The court held that labor in the mine is not the same as a building or improvement constructed upon lands and as such entitled to lien.

THE late decision of the Supreme Court of the United States making a ruling which construes the statute requiring the discovery of valuable mineral as a condition precedent to the right of location to except blanket formations is to the effect that, if a location is made in a section where there exists a known blanket vein, and A should make a location and go to work and B should follow suit and first reach ore, the latter's success would not oust A from the ground he claimed.

AT the converter of the Granby Co., at Grand Forks, B. C., the copper matte is converted into copper blister. The matte as it comes from the smelter carries from 50% to 65% metal. When it has been passed through the converter it carries from 92% to 98% copper and comes out in the form of blistered copper, having lost from 500 to 900 pounds weight of useless material in the refining process in the converter. It still carries, however, the gold and silver. This refined product is sent to New York for treatment.

REGISTRATION is a safeguard against the issuance of certificates of stock in excess of the company's authorized capital. Where stock is registered there is printed on the certificate itself a notice that it is not valid until countersigned by the registrar. This counter-signature is evidence that the shares represented by such certificate are part of the authorized capital of the company. It assures the holder that his certificate is issued only against the cancellation of a like number of shares of the original stock of the company.

MOUNT MCKINLEY, with an altitude of 20,464 feet, is the highest mountain in North America and forms the central point of an enormous and surpassingly grand mountain mass, situated at the headwaters of the Sushitna and Kuskowim rivers, in Alaska. Mount McKinley was known to the Russian settlers about the head of Cook Inlet nearly 100 years ago, and was called by them Bulshala—that is, Big. The first American to see and publish an account of it was a prospector named W. A. Dickey, who gave the mountain its present name.

WHAT was said in this paper regarding anything in mining or metallurgy twenty years ago, or ten years ago, or three months ago, might not be so now. A journal chronicles the state of the art at the time of its publication. As new discoveries are made and science progresses the facts change, and what this journal or any other mining journal said one year ago may be squarely contradicted by what it says this week or may say next week. Facts change and the fact of to-day may be the fallacy or error of to-morrow. It isn't a question of "consistency," but one of progress.

THE gold in the "banket," or conglomerate in the Transvaal deposits, is not found uniformly disseminated through the bed, which may be several feet thick, but is concentrated in what can be identified as the original bottom side of the bed when it was formed. This enriched portion is in places only 6 inches thick and rarely exceeds 30 inches. The remainder of this bed is barren

or at least too poor to pay the milling costs. The mining practice is to take out as little waste as possible with the pay rock. The great gold yield of the conglomerate is not due to its thickness, but to the great uniformity of value over the entire area of deposit. There are no true pay shoots in the conglomerate beds comparable with pay shoots in fissure veins.

IN electrical work an alternating current is one that is continually reversing its direction of flow, and is generally understood to be a current that reverses its direction at every pulsation. A good example of an alternating current is that which is produced by an ordinary magneto-generator; such as is used in telephone work. A magneto-generator is made up of a single coil of wire which is revolved between two magnetized pole pieces, the terminals of the wire being connected to two points which are kept continually in contact with the exterior circuit by means of brushes.

THE questions received to which the items on this page are answers are rarely published, the answer being indicative of the query and giving all that is needed, the statement itself being published in the shortest possible form. To publish the questions and to furnish the answers other than in this condensed way would transcend the limits of our space. If the answer to a question does not appear within a month after its receipt, it is an unusually hard one; it is not forgotten—only delayed. A question often involves considerable research—and then the answer may be in three lines.

THE Supreme Court of Idaho has made a decision that the filing of the articles of incorporation of a mining company, wherein the locators of a mining claim turn in their location in exchange for stock, constitutes a valid conveyance without a deed or other evidence of transfer. The case began as an adverse claim filed by the locators of the Havenor claim at Silver City, Idaho, against the Murray Hill Co., claiming that the conveyance being invalid, the work performed by the company did not prevent the forfeiture of the rights of the locators when they ceased to do assessment work.

EXTRALATERAL underground rights are often the most valuable obtained by a lode location. The statute requires that end lines of a lode location shall be parallel. Unless end lines or portions of them can be placed upon other patented claims, there will be many tracts of mining ground lying between irregular-shaped patented claims to which the mining laws will have no application. Unless the locator can place the lines within, upon or across adjoining or intervening property of another, he must choose between the loss of surface and the veins beneath, and the loss of the extralateral ground portions of the vein.

THE material which has the greatest strength for a given weight is the best for a flywheel. The explosive force increases as the square of the speed. Pine wood has a greater tensile strength than cast iron, and is much safer for a flywheel. For an engine running at a speed of 100 revolutions per minute, a properly constructed wood-rimmed flywheel is safe. Where the speed of the engine runs above 100 revolutions per minute, to keep the rim speed down to 5000 feet per minute the diameter of the flywheel can not exceed 16 feet. A balance wheel to run at a surface speed of 10,000 feet per minute has been constructed by winding a square steel wire on a cast iron spool.

THE date line coincides with the meridian 180° from Greenwich. It deflects between north latitudes 80° and 45°, so that all Asia lies to the west, all North America, including the Aleutian Islands, to the east of the line; and between south latitudes 12° and 50°, so that Chatham Island and the Tonga group lie to the west of it. A vessel crossing this line to the westward sets the date forward by one day, as from Sunday to Monday. A vessel crossing the line to the eastward sets the date back one day, as from Monday to Sunday. Hawaii has the same day name as San Francisco; Manila, the same day name as Australia, and this is one day later than the day of Hawaii. Thus, when it is Monday, Dec. 9th, at San Francisco, it is Tuesday, Dec. 10th, at Manila. An extended, scientific, illustrated detailed explanation of this whole matter appeared in the issue of Dec. 3, 1898.

THE amount of land which one person may acquire under the U. S. placer mining laws is unlimited, but the amount which he may acquire by a single location is limited to twenty acres, and an association of two or more persons, not exceeding eight in number, may make a single location of an area not to exceed twenty acres for each locator, thus making 160 acres for each eight persons. These locations when on surveyed public lands must conform as near as practicable with the United States system of public land surveys and the rectangular subdivisions thereof. A single discovery is sufficient to hold an entire location of 160 acres by an association, and discovery need not be made upon each twenty acres thereof. Upon application for a patent, however, legal subdivisions of such a group location which are shown to be valuable chiefly for agricultural purposes, may be excluded from entry for patent. Upon each location, whether of twenty acres by an individual, or of an amount not exceeding 160 acres by an association, \$100 worth of labor is required to be performed for each year beginning with the 1st of January next succeeding the date of location, until the claim is located in the Land Office for patent. Such labor may be performed upon one only of a group of locations if the total value thereof equals \$100 for each location, and if such labor will inure to the benefit of each location within the group.

Late Gold Dredging Practice.*

NUMBER VI.

Written for the MINING AND SCIENTIFIC PRESS
by RALPH L. MONTAGU.

In Fig. 15 I have shown a plan of the wiring and connections and necessary instruments for a dredger

lecting rings of this type than with the commutator of a direct current machine.

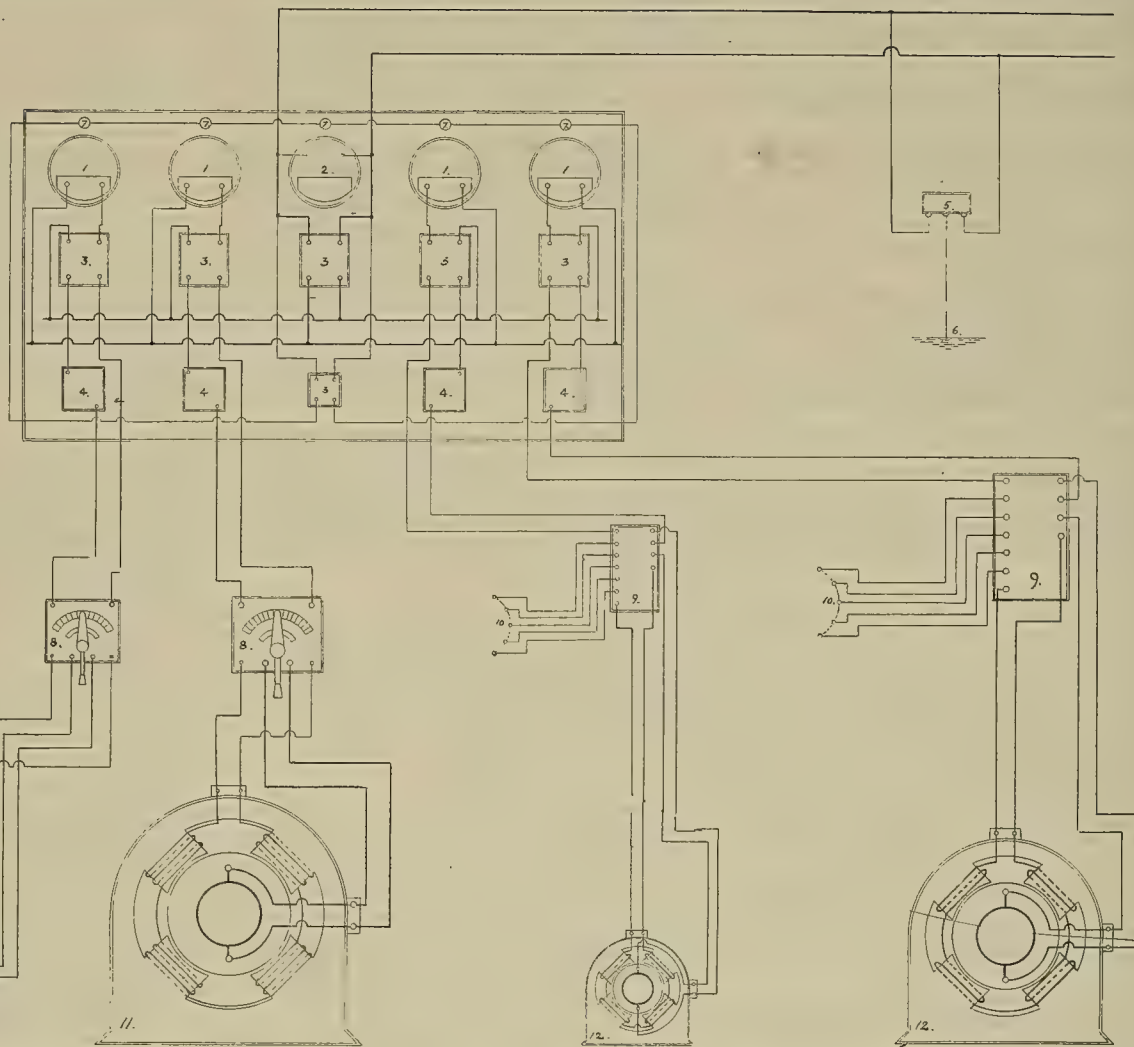
These motors are started, stopped, reversed and their speed is regulated by means of a controller similar in outline to that used for a direct current series wound motor. Fig. 16 shows the necessary wiring, etc., for a dredger (Figs. 1 or 2) where the current consists of a three-phase 1000-volt alternat-

a system of wiring for direct or alternating current, whereby one ammeter can be used on each individual circuit without interfering with any of the others, but the saving effected in first cost if this is used does not, I believe, compensate for the advantage to be gained by having a meter on each separate circuit.

On account of the size and weight of the wires

Fig. XV.

1. Am-meters.
2. Volt-meter
3. Switches
4. Circuit Breakers.
5. Lightning Arresters.
6. Ground Connection.
7. Incandescent Lamps.
8. Starting Devices.
9. Controllers.
10. Variable Resistances
11. Constant Speed Motors.
12. Variable Speed Motors.



of types Fig. 1 or 2; for a direct current system, the different classes of motors are shown in outline.

The best location for the switchboard is in the pilot house, the starting devices for the motors that drive pumps, grizzlies or any other machinery that is not controlled by the operator, should be located as near their respective motors as possible. The controllers for the motors that drive the bucket chain and the winch should be placed in such a position that they are within arm's length of where the operator stands when the dredger is working.

I have not shown the individual light circuits, but this plan being intended for a 500-volt direct current system, five incandescent lights have to be connected in series between the mains. The branch wires for lights should be taken off the mains before they (the mains) are connected to the main switch.

It was as recent as 1888 when the theory of the rotating field motor was first discovered; this made possible the use of the alternating current to operate self-starting induction motors.

There are two types of alternating current motors that can be used on a dredger, viz.:

(a) The short circuited secondary induction motors, and, (b), the external dead resistance (in secondary) induction motor.

These motors correspond as regards their speed and starting torques with the shunt wound and series wound current motors respectively.

In starting the (a) type of motor an arrangement of transformers is effected whereby a reduced voltage is delivered at the terminals of the motor in order to prevent an excessive flow of current, and as soon as the motor has attained its speed the transformers are cut out of the circuit. These motors present a very simple outside appearance. There are only the terminal blocks to connect the wires to, no brushes or commutator, as on the direct current motors.

The type (b) motor has a set of three or more collecting rings on the shaft of the armature or rotating element, with their necessary brushes, but there is considerable less trouble experienced with the col-

ing current circuit.

Transformers are needed to reduce the voltage from 1000 to 400 for the smaller motors, because alternating current motors of a size less than 50 H. P. are usually wound for a voltage of 200 or 400, and to supply a low pressure current (100 volts) for the incandescent lights. It is a distinct advantage to have a Stillwell regulator connected in the light cir-

needed to carry the current, I am in favor of bringing aboard the dredger a current at a pressure of not less than 1000 volts, where the alternating system is used, and where very powerful machinery is used this voltage could be increased to 2000 without danger.

As a dredger is constantly moving, some means have to be devised for keeping the electric connec-

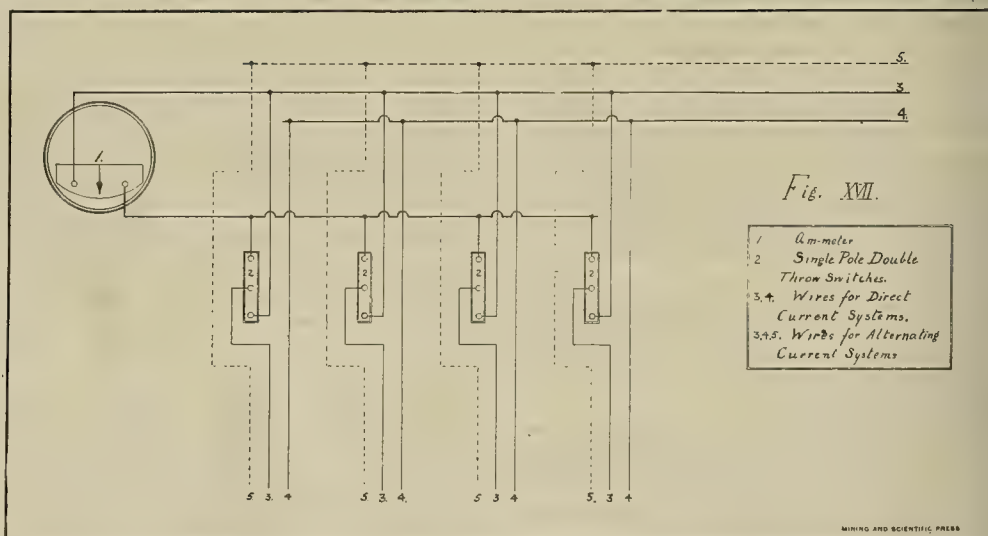


Fig. XVI.

1. Am-meter
2. Single Pole Double Throw Switches.
- 3, 4. Wires for Direct Current Systems.
- 3, 4, 5. Wires for Alternating Current Systems.

cuit so as to keep the lights steady.

In practice not more than twelve incandescent lights should be connected in any one circuit. As will be seen from a comparison between Figs. 15 and 16, the alternating current needs a more complicated arrangement of wires. The same remarks in regard to meters, etc., that have already been written in reference to direct current systems apply to alternating current systems.

If it should be necessary, I have shown at Fig. 17

tion with the pole line on shore constant.

In some cases a special cable is made containing the two or more conductors insulated from each other. This cable is supported on a number of small pontoons and the slack cable is coiled up on shore and left on the damp ground in a number of cases. A better method to accomplish this object is to have a special reel made and placed on the dredger (Fig. 18); the wires from the reel are connected to the pole line, and when it is necessary to pay out or take

up slack no time is lost and there is no danger to the man from an electric shock.

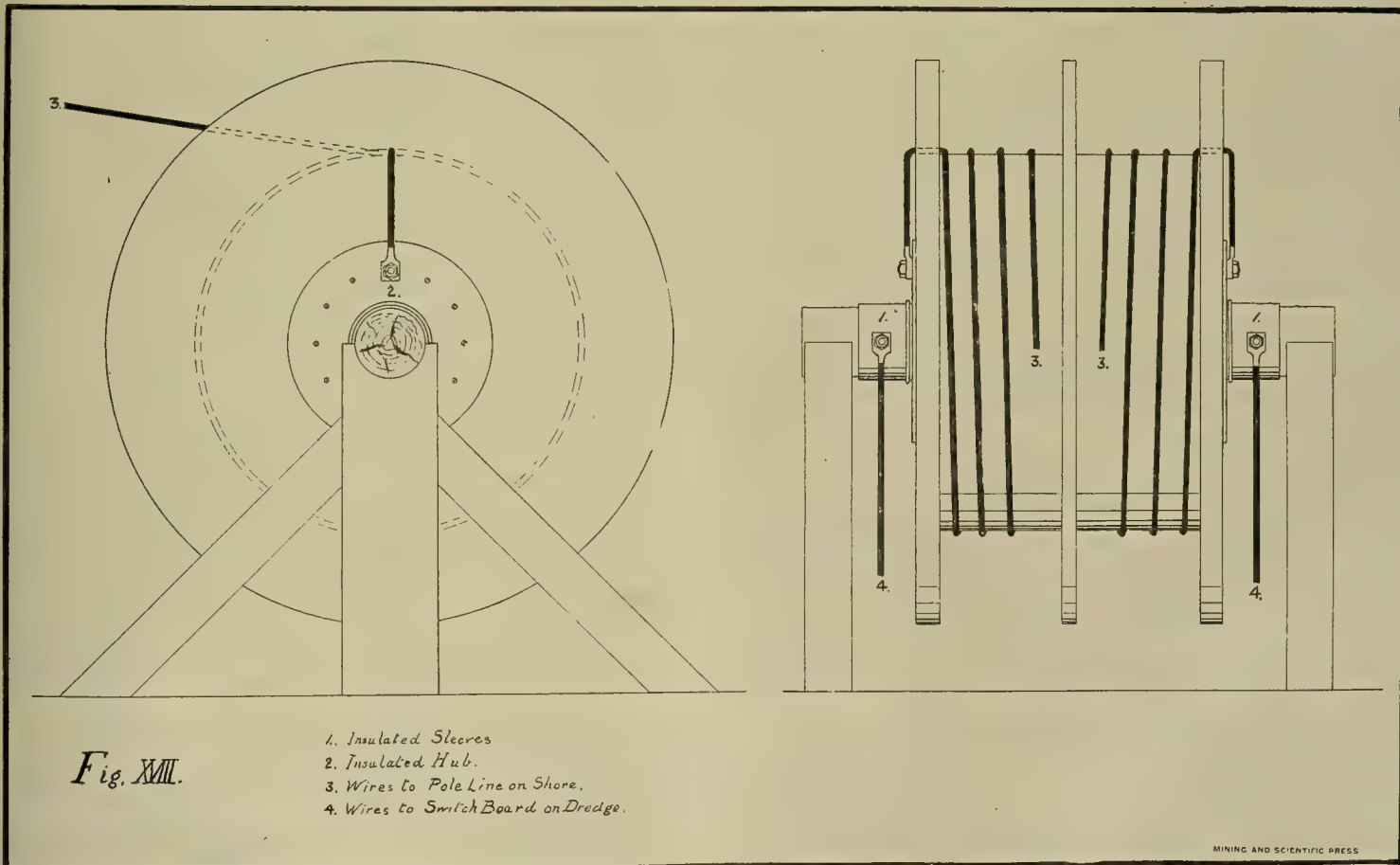
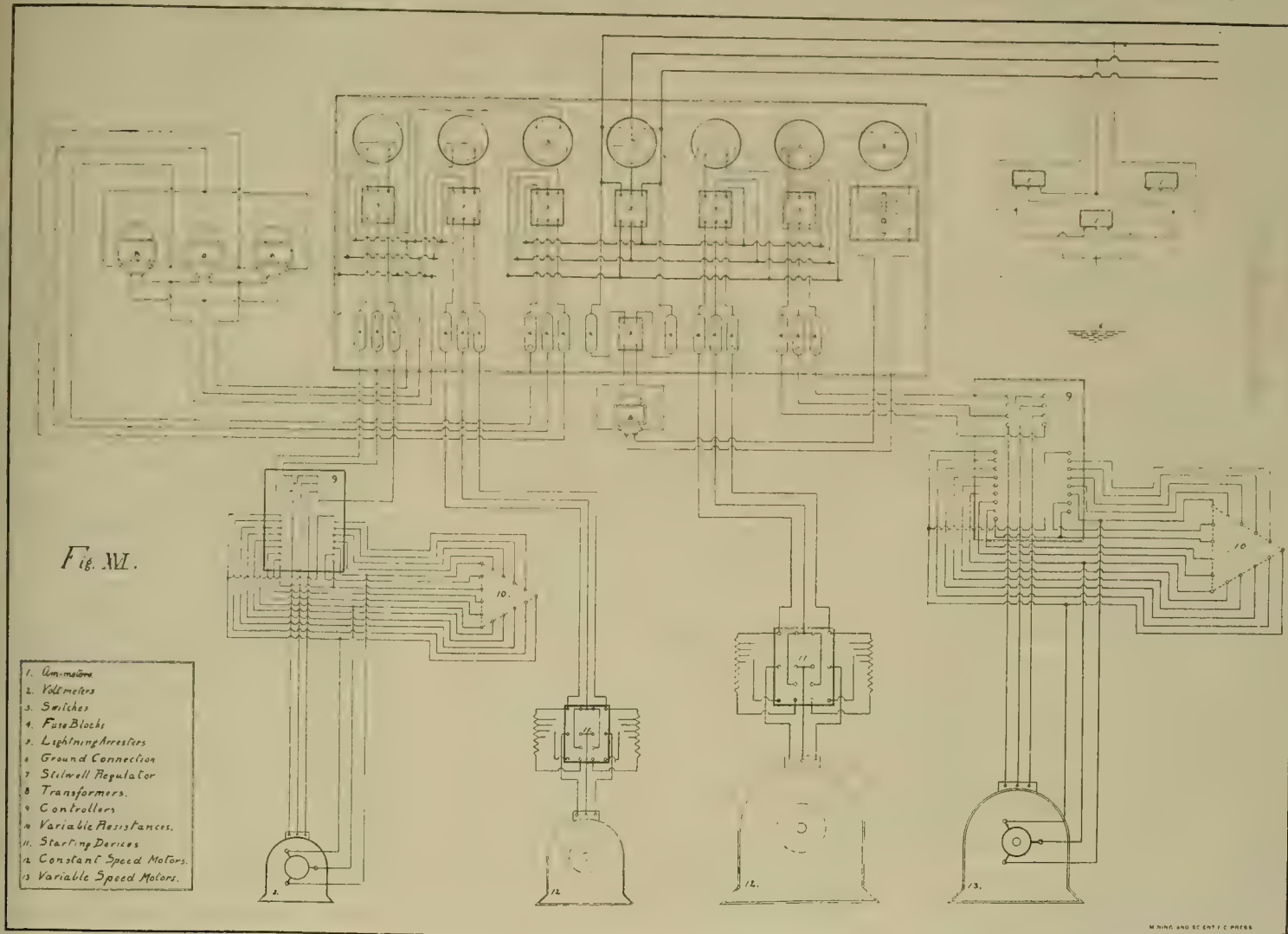
The reel should be made of thoroughly seasoned hard wood and painted with a waterproof insulating paint. The wooden shaft is stationary and two brass

and wires leading to the switchboard are connected to the sleeves, as shown in the illustration. Hand spokes are placed on the periphery of the reel to facilitate rotation when necessary.

I do not think it necessary to go into a lengthy de-

Silver Mining Will Pay.

Will silver mining pay? is a question often asked, and it is to be admitted that valuable mining properties are condemned simply because they are silver



sleeves are firmly attached to and thoroughly insulated from it; brass hubs, which freely revolve on these sleeves, are attached in a similar manner to the reel. The ends of the flexible wires from the pole line on shore are connected to the brass hubs,

scription of electric power plants, as that subject has been dealt with by a number of writers and at great length, but the description given here of the electrical equipment of a dredger is, I believe, new. (TO BE CONTINUED.)

mines and for lack of a satisfactory answer to this question. The purpose of this article is to demonstrate that silver mining will pay with the same economy now practiced in successful gold mining attending, and with greater returns on a like invest-

ment, notwithstanding the extremely low price of silver.

Within a radius of 15 miles of Lovelocks, Nev., are several famous mines noted for their past records as silver producers. These silver mines were operated more than thirty years ago, when everything in the mining and milling line was necessarily high, particularly so when compared with the ruling prices of the present day. Silver, however, was then worth from \$1 to \$1.29 per ounce. This made it possible for silver mines to pay handsomely, regardless of the remoteness from civilization and the high prices of the commodities incident to their operation. While silver was then worth in the neighborhood of twice as much as it is to-day, we find more than a counterbalance in the fact that all the commodities used in silver mining and milling are procurable to-day for less than one-half what they were thirty years ago.

We will make a few comparisons of the prices of the principal commodities used in silver mining then and now. These figures are taken from authentic records, furnished from reliable sources, and represent cost delivered at the mines:

Powder, former price, 35c per pound, now 15c; fuse, formerly \$2.50 per 100 feet, now 85c; caps, formerly \$2.50 per 100, now 85c; candles, formerly \$7.50 per box, now \$2.50; picks, formerly \$2.50, now \$1; shovels, formerly \$2 each, now 85c; hammers, formerly \$2.50, now 85c; pick and drill steel, formerly 25c per pound, now 11c; track iron, formerly \$200 per ton, now \$60; mine timbers, formerly \$125 per M, now \$35; blacksmith coal, formerly 10c per pound, now 4c.

Water and air pipe are now procurable at about 25% of their former cost.

The only item that has not been correspondingly reduced is that of miners' wages. However, the old scale of wages could be well maintained and the same mines pay handsomely, for with the modern machinery the miner can do twice the amount of work he formerly did in the same time.

The machine drill, in itself and alone considered, is convincing evidence of this last fact. Now we will make a few comparisons of the relative cost of the expenses in connection with the milling of silver ores, assuming that these ores would be subjected to the same treatment, necessitating the use of the same chemicals that were in use thirty years ago, which is not the case by any means. Simpler and less expensive methods are being used at the present day—the result of strides in the science of metallurgy for the intervening thirty years—which we will not take into consideration.

Quicksilver, former price at mills, \$125 per flask of seventy-two pounds, now \$55.

Bluestone, former price 25c per pound, now 3c.

Salt, of which a considerable quantity was used, was gathered in an impure state from the salt marshes and fed to the mills without first being refined, increasing the milling cost in this item, since the salt crust rarely contained over 35% of salt, to about three times what it should have been, not to speak of the extra cost of running through the mill the 65% of waste contained in the crude salt cake. The impure article cost \$25 per ton, now the pure rock salt is obtainable for \$20 per ton. Other chemicals of minor importance are to be had at about 40% of their former cost.

The cost of power, the principal milling item, formerly about \$1.50 per H. P. for every twenty-four hours, can now be had for about 40c. And the same power in the same time will reduce more ore than formerly on account of the greater efficiency of modern mills.

With the progress that is being made in the use of hydro-carbons as fuel for generating steam, the cost of mill power will admit of much greater reduction than the price named as the present cost. On the whole, the milling cost of reducing ores would be less than 40% of the former cost.

Everything considered, where are the inducements greater for the profitable investment of capital than in the operation of our silver mines? With mining reduced to the science that it is to-day, silver mining must be profitable.—Lovelock, Nevada, Tribune.

C. J. JOHNSON of St. Louis, Mo., claims to have discovered a process for hardening metal articles for which he claims many advantages. The articles formed must be at a white heat. They are cooled to a cherry red heat by directing a current of air on them; then submerged in a bath or solution made up as follows: Sal soda, 1½ parts; resin, 1½ parts; animal oil, 3 parts, which is mixed in water. The relative proportions of the above ingredients may be varied slightly, but the figures given are approximately the ones used in practice.

SCIENCE is ready to build a telephone circuit completely around the earth. So far as invention is concerned, the work is done. It is now a question for capital. It involves a cable laid across the Atlantic ocean from New York to Southampton, and after passing under the English channel, by way of Paris, Berlin, Vienna and Constantinople across Asia to Calcutta. Thence it would follow the Chinese coast to Behring straits, where, crossing over to Alaska, it would run southward to San Francisco and thence back to New York.

Can Gold be Made Artificially?

Written for the MINING AND SCIENTIFIC PRESS by EDWARD BOOTH.

Within the past few weeks a number of articles have appeared in the daily papers announcing that a Colorado assayer named Wynn has discovered a method of making gold; and the further statement was made that the discovery has caused much excitement and is believed in by careful, shrewd, business men. An account is given of one test in which ore shown by ordinary assay to contain \$1 yielded by the Wynn process \$44 in gold. It is all accomplished, as is lucidly explained in the telegrams, "by a combination of acids," and the discoverer very naturally refuses to give up the combination.

There is a possibility, but an extreme improbability, that Mr. Wynn may have found the philosophers' stone, sought in vain by the old alchemists, and may have learned the secret of the transmutation of the metals. No one familiar with chemistry would pronounce such a thing absolutely impossible, however improbable. Gold has always heretofore been considered an element—something that could not be made because of the impossibility of finding anything simpler from which to make it. When chemistry was in its infancy gold was the quest of the pioneers in the science. The alchemists, purposely enveloping their work in mystery and regarded as in league with the devil, worked with all the materials at their disposal to this end, and failed. And all the works of their successors have been as unsuccessful.

If gold be actually an element, it is, of course, impossible to make it from anything simpler—it cannot be built up from its constituents because it has no constituents. The only way to make it would be from unrecognized gold compounds. Mr. Wynn claims to have made gold from talc; and he might argue that the talc, or some part of it, is a compound of gold, but this supposition is as likely to be untrue as is the first.

The whole question as to the possibility of making gold depends on whether our so-called elements are really such. If not—if they be really compound substances, be made up of simpler substances—then anything in the way of transmutation of metals becomes a possibility. And it is because of ignorance on this point that chemists are unable to absolutely condemn such a discovery as that reported to have been made in Colorado. Chemists do not know whether the elements really are elements or not. The evidence is almost wholly negative. Certain things, such as gold and silver, are called elements because they are not known to be compounds. But it has not been an unusual incident in the history of chemistry for a so-called element to be proved to be a compound. Sir Humphrey Davy, nearly a century ago, succeeded by means of an electric current in proving that soda and potash, then considered elements, really contained the metals sodium and potassium, since regarded as elements, because no later Davy has found a way of breaking them up. Still later, Lord Rayleigh and Prof. Ramsay, after a thorough examination as was possible at the time, pronounced argon an element, only to modify their opinion a few months later and announce the discovery in it of at least five elements. And latest of all—in fact, later even than the Colorado gold discovery—comes an announcement from the Harvard Observatory that indications had been obtained pointing to the probable compound character of hydrogen, one of the most carefully and thoroughly studied of all the elements.

With a knowledge of such facts, and with the further knowledge that certain inexplicable relations exist among the different elements in their weights and in their chemical behavior—relations indicating some kind of a connection not yet discovered—it would be foolish to pronounce the Colorado discovery an impossibility.

That it is an extreme improbability may easily be shown. Up to the present time the most painstaking and skillful investigations, conducted by the most learned experimenters with the best obtainable apparatus and methods, have given no indications whatever that gold is not an element. It is not at all likely that a man ignorant of chemistry and of chemical methods and working with imperfect apparatus should have discovered what more learned men have absolutely failed in. If this were unexplored ground, the case would be different; but the very causes that led to his investigations have carried hundreds of others into the same field of work, and all have failed.

Moreover, it must be remembered that while the compound characters of some supposed elements have been proved, it has not been an easy task, and has frequently been achieved only after the discovery of new methods of work. Davy isolated sodium and potassium by using the power of electricity in analysis—a new power in his time. Rayleigh and Ramsay broke up their original argon into its parts by using the extreme cold of liquefied air—a method never before possible. And Prof. Pickering, who claims to have discovered evidences of the compound character of hydrogen, did so by photographing the spectrum of a streak of lightning.

Reported discoveries of methods of making gold—common enough in ancient times—are not uncommon

at the present time, and each, no matter how improbable, finds believers, and believers, too, who are described as shrewd business men. All old Californians remember the claim made a few years ago that a method had been found of extracting gold from the waters of the Calistoga springs. And only a couple of years ago two of the most notable of these gold schemes came to untimely ends in the United States. One of these was like that of Wynn, and professed to make gold from material known to be free from it. The other was of a different order. It was the alleged discovery of the "Rev." J. F. Jernegan, who asserted that he could recover gold from sea water in profitable quantities. He announced that he had invented an electric device which he called an accumulator. This apparatus—a small receptacle containing mercury—was sunk in the sea after having been connected with an electrical machine on shore. At the end of twenty-four hours it could be raised and from the mercury could be obtained gold to the value of \$1.27. A company was organized, money flowed in, investors were given every opportunity for investigation—were allowed to furnish their own accumulators, sink them in the sea at the company's wharf and watch until the requisite time had elapsed. Then they could take the mercury away and have it worked as they might wish. And always it produced gold. For a long time the scheme was worked successfully, and it was only a disagreement about salary that finally caused the diver who was employed to walk out under the wharf and "salt" the accumulators to expose the fraud.

It was during this same time that Edward C. Brice was making gold in Chicago. He told a story a good deal like that told by his Colorado successor. While working as an assayer in the Black Hills he had studied nature's way of making gold and had finally grasped the secret. He made less of a mystery of his process, however, than is customary.

"Take an ordinary crucible," he said, "and place in it a layer of powdered charcoal. On this put a layer of sulphur, then another layer of charcoal; next a layer of iron filings, and finally a top layer of granulated antimony. The contents of the crucible must be fused together and will then show the presence of a large quantity of gold."

A company was organized and stock rapidly rose in price until it was largely sought at \$400 a share. A big gold factory was erected and work went on night and day. When the news of the Jernegan fraud reached Chicago the stockholders became anxious, began an investigation and the works closed. That was the latest gold making until this recent Colorado scheme came to light.

Reduction and Refining of Copper by Electrolysis.

The Hoepfner process for obtaining copper and other metals directly from the ore or concentrate by electrolysis was first described in 1891. Several plants have been erected to put it in operation, all of which have been more or less unsuccessful when applied to copper. The latest of these was built at Papenberg in 1898, but no authentic account of its industrial success has been obtained. The same process was tried in America with copper-nickel matte from Sudbury, Canada, but resulted in failure for the reason that the metals produced were spongy and below the merchantable standard of purity.

Under this process copper ores or concentrates are pulverized and then dissolved in a chlorine solution, which is treated in tanks made of wood impregnated with asphalt and lined with sheet lead. The anodes are of carbon, the cathodes of sheet copper, and they are separated in the bath by a diaphragm of cloth. The solution being decomposed by the action of the electrical current, the copper is deposited in crystals of pure metal on the cathode, while the chlorine thereby released remains in the stream of solution directed against the anode, and by combining with the protochloride forms bichloride of copper. The solution thus charged is then withdrawn from the tank, heated, and used in leaching fresh ore to obtain the original solution. The leaching process is a cycle, in which the solution is pumped up and passes through the pulverized ore again and again without addition of chemicals, and it is claimed that in working Rio Tinto ores containing 2.37% copper, 91% of the copper can be leached out in four hours, while only 3% of the iron pyrites in the ore is dissolved. The leaching process is quickened by agitating the mixture of ore and solvent either in revolving drums or in stationary tanks by the injection of currents of air. Professor Schnabel gives the efficiency of this process at ninety pounds in twenty-four hours for each horse power converted into electrical current and passed through the precipitating circuit, but he declines to indorse the process as practically useful when applied to the refining of copper.

THERE are many problems connected with the use of explosives in rocks of different hardness, and with different angles of incidence of the tunnel on the strike of the bedding and cleavage planes of the rock, on which more knowledge is desirable. With such knowledge, it is possible some general rules of practice in drilling and blasting can be formulated that will lessen average costs and reduce the average consumption of time.

Mountain Roads.*

NUMBER II.

By JAMES W. ABBOTT.

Cribbing is temporary in character, its use costly, and always to be avoided wherever practicable. When indispensable, it should have a batter not steeper than one horizontal to four vertical. Roads excavated in solid rock should have an inside batter of one horizontal to four vertical. This affords some latitude for projecting loads, which might otherwise be crowded off the road.

Roads excavated in plowing or picking ground should have a batter of one horizontal to one vertical; in other words, the inside bank should have a 45° slope. Where steeper, there is too great injury from ice and water. This batter can always be secured without excessive cost. On sidehill grades made for wagon roads an outside bank made of loose material can generally be depended on to stand permanently at an angle of 40° with the horizon. If made of rock, it will sometimes stand at a steeper angle and sometimes not, depending upon the tendency of the rock to disintegrate, so that it is best to adopt a 40° slope as a basis for estimates. Dry stone retaining walls should be used only where indispensable, and should never be steeper than one horizontal to two vertical.

WIDTH.—Cost, amount of traffic, safety and comfort are the factors which must determine the width of a wagon road. Comfort and convenience are, of course, promoted by a double track. Extensive traffic demands it. Safety requires so much of it that teams can pass and never be caught unawares on a single track.

The proper width for double track and heavy teams is 16 feet, while it is possible for them to pass with extra caution on a 14-foot track on a straight road. For single track and greatest safety a desirable width is 12 feet, while 10 feet is generally safe, and an 8-foot roadbed can be driven over if the inside bank has sufficient batter, so that vehicles will not be crowded off.

Double tracks for turnouts should never be less than 75 feet long. These should be visible from each other and from every foot of the intervening distance. Before laying out a road, the maximum distance between turnouts should be determined from all the conditions, especial consideration being given to the amount of travel likely to occur at night, and this maximum should never be exceeded. Where the conditions make it imperative to establish this maximum at over 100 feet for turnouts adapted to heavy traffic, it is well to widen the road for short distances at intervening intervals for light vehicles. A width of 12 feet will allow light vehicles to pass each other in emergency. Where the utmost economy must be observed, this extra width for a short turnout can be secured by cutting into the bank previously constructed with proper batter. Of course, it makes the inside bank too steep at these places, but it is a choice of evils in the interest of greater convenience and safety to light traffic.

It is obvious that in sidehill grades excavated in picking or plowing ground that portion of the road that is formed from the original material in place must for a time be more solid than the portion built out. It is, consequently, desirable on roads designed for very heavy traffic that all the wheels of heavily loaded wagons should rest upon the original solid formation. Standard vehicles are either 4 feet 6 inches or 5 feet between the centers of the tires. A very heavily loaded wagon can not be restricted to the same width of roadbed as light vehicles, but should be allowed a latitude of 8 feet for varying conditions of draft, road surface, etc.

A hillside composed of picking or plowing ground is rarely ever steeper than 35°. A hillside grade formed by cutting 8 feet into such material makes an excellent roadbed. The inside 8 feet of it is solid from the first and adapted to the heaviest traffic, and the balance, made by the fill, is sufficiently wide to allow lighter wagons to pass. The following table shows the total width of such a roadbed for various sidehill slopes and the amount of material which must be excavated for each 100 feet of roadbed:

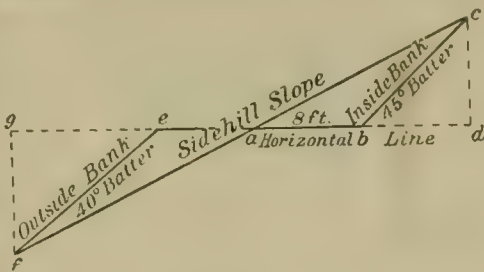
| Sidehill slope. | Width made by fill. | Total width. | Excavation per 100 feet. |
|-----------------|---------------------|--------------|--------------------------|
| DEGREES. | FEET. | FEET. | CUBIC YDS. |
| 5 | 7.89 | 15.89 | 11.26 |
| 10 | 7.83 | 15.83 | 25.33 |
| 15 | 7.72 | 15.72 | 43.41 |
| 20 | 7.52 | 15.52 | 76.41 |
| 25 | 7.29 | 15.29 | 103.31 |
| 30 | 6.87 | 14.87 | 161.78 |
| 35 | 5.94 | 13.94 | 276.59 |

The following diagram and mathematical discussion are given to show the method by which the results presented in the table were obtained.

In the following the inside bank is calculated with a batter of 45° (one to one) and the outside one with a batter of 40°. The results of any other depth of cut may be quickly obtained from the table by simple proportion. For instance, for a cut of 7 feet into the

bank the total width of roadbed would be seven-eighths of the figures in the table; for a cut of 9 feet the total width would be nine-eighths; for a cut of 10 feet, ten-eighths, etc.

Applying to this a 25° slope, we find that a 10-foot cut into the bank gives a total width of 19.11; a cut of 9 feet gives 17.20; one of 7 feet, 13.38; one of 6 feet, 11.47, and one of 4 feet, 7.64.



$$\begin{aligned}
 A &= cad = \text{sidehill slope.} \\
 x &= bd = \text{vertical depth of cut.} \\
 1 : \tan A :: 8 + x : x. & \quad x = \frac{8 \tan A}{1 - \tan A} \\
 z &= ea = \text{width of road made by fill.} \\
 z + 8 \text{ ft.} &= \text{total width of road.} \\
 y + gf &= \text{vertical depth of fill.} \\
 yz &= 8x. \quad z = \frac{8x}{y} \\
 z &= y [\tan (90^\circ - A) - \tan 50^\circ]. \\
 8x &= y^2 [\tan (90^\circ - A) - \tan 50^\circ]. \\
 y &= \sqrt{\frac{8x}{\tan (90^\circ - A) - \tan 50^\circ}}. \\
 z &= [\tan (90^\circ - A) - \tan 50^\circ] \sqrt{\frac{8x}{\tan (90^\circ - A) - \tan 50^\circ}}. \\
 z &= \sqrt{8x [\tan (90^\circ - A) - \tan 50^\circ]}.
 \end{aligned}$$

Amounts of material which must be excavated increase or decrease as the squares of the depth. To illustrate: For a cut of 7 feet the amount of excavation would be $\frac{49}{64}$ of the amount given in the table; for a cut of 6 feet, $\frac{36}{64}$; for a cut of 5 feet, $\frac{25}{64}$, and for a cut of 4 feet, $\frac{16}{64}$. The following tables show the total widths of roadbed and amounts of excavation for a cut of 6 feet and for a cut of 5 feet:

| 6-FOOT CUT INTO PLOWING OR PICKING GROUND. | | | | 5-FOOT CUT INTO PLOWING OR PICKING GROUNE. | | | |
|--------------------------------------------|--------------|--------------------------|--|--------------------------------------------|--------------|--------------------------|--|
| Sidehill slope. | Total width. | Excavation per 100 feet. | | Sidehill slope. | Total width. | Excavation per 100 feet. | |
| DEGR'S. | FEET. | CU. YDS. | | DEGR'S. | FEET. | CU. YDS. | |
| 5 | 11.92 | 6.33 | | 5 | 9.93 | 4.40 | |
| 10 | 11.87 | 14.25 | | 10 | 9.89 | 9.97 | |
| 15 | 11.79 | 24.41 | | 15 | 9.83 | 16.96 | |
| 20 | 11.64 | 37.89 | | 20 | 9.70 | 26.33 | |
| 25 | 11.47 | 58.15 | | 25 | 9.56 | 40.41 | |
| 30 | 11.15 | 91 | | 30 | 9.30 | 63.19 | |
| 35 | 10.45 | 155.59 | | 35 | 8.71 | 108.06 | |

In the above tables no account is taken of either increase or shrinkage in bulk of such material. On shallow fills of this nature the first effect would be a slight increase in bulk, which would tend to make the road a trifle wider, but the ultimate result would be practically what the figures in the tables indicate. That tendency always acting for the outside of the road to become lower and the inside higher must be overcome by repairs. We see from the tables that while we should cut 8 feet into the bank for a double-track road a cut of 5 feet will give a practical single-track road with only $\frac{25}{64}$ as much excavation, or that the double-track road requires more than two and one-half times as much excavation as a single track.

In sidehill grades in rock the conditions are very different. Rock excavations are made by blasting, which throws a large proportion of the rock down the hill, and consequently the material thus broken out can not be depended on with any certainty for fill. That which does remain available increases in bulk about 50%.

On rock slopes up to 20°, unless very smooth and slippery, a fill will stand, the natural friction of the surface being sufficient to hold it firmly. Above 20° this can not be relied upon, and any rock fills made on such slopes must be very carefully secured at the bottom to prevent sliding.

As stated above, while a bank made of broken rock will often stand with a steeper batter, it is not safe to figure on more than 40°.

When the natural surface of the rock is too steep to hold a fill it is often the better practice to cut the entire roadbed out of the solid rock. A roadbed on a solid rock shelf is absolutely secure and in no danger of giving way without warning, because cribbing becomes rotten or retaining walls fail. Such a roadbed for single track should be 10 feet wide, carefully protected on the outside by a guard log not less than a foot in diameter at the small end, firmly bolted to the rock. The amount of excavation in solid rock on different hillside slopes to obtain such a roadbed is shown in the following table, accompanied by diagram and mathematical discussion illustrating how the results were obtained.

The table below can be used for deeper cuts by remembering that the amount of material varies as the square of the depth of the cut. For instance, an

11-foot cut will require $\frac{121}{100}$ the excavation shown in the table; a 12-foot cut, $\frac{144}{100}$, etc.

| Sidehill Slope | | Excavation per 100 feet. | |
|----------------|----------|--------------------------|----------|
| DEGREES. | CU. YDS. | DEGREES. | CU. YDS. |
| 5 | 16.30 | 25 | 97.78 |
| 10 | 34.07 | 30 | 125.19 |
| 15 | 53.33 | 35 | 157.04 |
| 20 | 74.07 | 40 | 196.30 |

$$\begin{aligned}
 A &= bad = \text{sidehill slope.} \\
 x &= cd = \text{horizontal depth of cut.} \\
 4x &= bd = \text{vertical depth of cut.} \\
 1 : \tan A :: 10 + x : 4x. \\
 4x &= x \tan A + 10 \tan A. \\
 10 \tan A &= 4x - x \tan A. \\
 x &= \frac{10 \tan A}{4 - \tan A}.
 \end{aligned}$$

A preliminary survey of a contemplated line with some simple clinometer, determining the sidehill slopes for each 100 feet, and noting whether in solid rock or otherwise, will furnish the basis for an approximate estimate of the cutting, which is always by far the largest item of cost in a mountain road.

(TO BE CONTINUED.)

Granite and Syenite.

Granite and syenite look much alike to a casual observer. They cannot be distinguished by the texture. The essential constituents of granite are quartz, orthoclase (potash), feldspar and mica. This is simple granite; but in this rock also occur numerous other minerals, most of which cannot be distinguished without the aid of the microscope. Syenite consists of orthoclase, feldspar and hornblende—quartz not an essential constituent, but often occurs. Diorite differs from the above in the character of the feldspar. Its essential constituents are hornblende and plagioclase (soda-lime) feldspar. When quartz occurs it is called quartz-diorite, and when mica is present, as well, it is known as quartz-mica-diorite. Magnetite often occurs so abundantly in the fine-grained varieties as to give the rock a black color. Diorites range in color from light gray to green and black. Typical rocks are rare. They usually graduate from one variety to another, and the name is usually applied in consideration of the most prominent constituents. In California the granite of the Sierra Nevada contains the essential constituents of both typical granite and typical diorite—hence the name grano-diorite. Phonolite is usually rather fine-grained, dark and compact, and when struck gives out a ringing sound. It would be impossible to identify the rock without a great deal of knowledge of the rock-forming minerals. In the Black Hills phonolite the principal constituents are nepheline, sanidine, aggrine, noselite and sodalite—minerals familiar only to students of petrography. Porphyry is a name employed to designate a rock having distinct crystals occurring in a ground mass of finer grain, as quartz-porphyry and granite-porphyry, meaning a granite of even grain, in which occur crystals of feldspar. Porphyry does not mean any particular kind of rock, but has reference to the structure only.

In the early days of metal mining in this west half of America mine operators dreaded the time when their workings should reach the permanent water level, below which it was almost a sure thing that the rich oxidized ores which they were having smelted at a good profit would be found in the shape of sulphides, which were at that time termed "refractory ores." The richest sulphide ores of those days were first roasted, either in roasters or in great piles in the open air, where a layer of wood was followed by a layer of ore, more wood and more ore, until it became inconvenient to make the pile higher. The pile of ore and wood would burn for days at a time, and the sulphur in the ores, which caused the trouble in smelting, was driven off, leaving the roasted ore in good shape for smelting, or, in the case of high-grade gold ore, for milling. The great advance made of recent years in the arts of metallurgy and in the mechanical appliances used in connection with the smelting of ores has removed much of the expense of treating sulphide ores. The advent of the modern smelter and modern concentration machinery has still more reduced the class of ores formerly considered too refractory to admit of profitable mining. It is generally considered that strong veins of sulphide ores are more certain to hold out and to continue in the profitable class at great depth than those that are free from an admixture of sulphur in their combination.

GEORGE A. TREADWELL, who claims to be a copper mining expert, says: "Statistics have been prepared within a year which show that the world has 5600 copper mines and only twenty-eight of them dividend payers."

*From Year Book U. S. Department of Agriculture for 1900.

A Cyanide Mill of the Black Hills, South Dakota.

Written for the MINING AND SCIENTIFIC PRESS by
EVERETT B. SAWYER.

In June, 1900, several business men of Deadwood, S. D., having interests together in the Yellow Creek district, some 3 miles from Lead, built the Wasp No. 2 cyanide mill. It was a fifty-ton plant designed to treat some 18,000 tons of shale and quartzite ore that had an average value of \$8 to \$12 in gold and about 1½ to 2 ounces silver per ton. It was the low-grade ore left from rich pockets mined at earlier periods.

A rather steep hill millsite was chosen so that the ore is carried down by gravity. The ore comes from an open cut some 800 feet back of the mill and is trammed in trains of eight cars by one mule to mill bin above 4x10-foot grizzly leading to No. 2 Gates crusher. The crusher breaks to a 2-inch ring, thence it goes to a pair of 24x14 Gates rolls set at ½ inch, thence to second rolls of same size and make that crushes to about ¼ inch. From here it is elevated by a 12-inch belt elevator to a flat 2½-inch mesh screen set at 45° over receiving bin, thus giving about a six-mesh product for leaching. Over size goes back to second rolls.

This seems rather coarse crushing for so hard an ore, but the values are almost entirely on the cleavage planes and yield to cyanide readily. The leaching room had four tanks each of fifty-four tons capacity. At first the tanks were filled by a dry car, but later a belt conveyor automatically fills a tank in an hour and a half. The zinc dust was first tried as a precipitant, but the shavings were found more satisfactory. Fuel being something of an item, a good 12x36 Corliss engine was installed and easily runs the mill with but little fuel and care. Two 16-foot economic boilers are set up, one only being used at a time. Water is supplied by a gasoline engine pump and gives a sufficient amount for sluicing out the tanks, thus saving time and labor. Zinc shavings are cut by the night engineer from the usual disc lathe. Electric lights are used throughout.

The entire plant cost less than \$35,000. In a ten months' run with R. F. Plintermann as chemist and mill superintendent, enough bullion was turned over to John Gray, the general manager, to more than pay for the mill, together with the mining and milling costs.

It was then found that some 12 feet of the underlying straight quartzite running from \$3 to \$5 could be treated at a profit. C. C. Griggs succeeded Mr. Plintermann as superintendent, the latter resigning. The mill was enlarged, a No. 3 Gates crusher replacing the No. 2 and a 100-ton leaching tank added and the mill pushed to its full capacity. During the summer nothing but straight hard quartzite was treated. The mill tonnage averaged 105 tons per day of twenty-four hours with two men as engineers, two tank men, two roll men, two on solution and one crusher man.

The ore is leached first with a five-pound solution, then weaker ones. It is but three days from the time the ore is conveyed to the tank until it is sluiced out, and in that time is leached from about a \$4 head to 80 cents to \$1 tails.

This quartzite ore is harder on crushing machinery than most hard ores. It is found necessary to put in new crusher concaves every month or six weeks. The first roll tires wear out in four months, while the second ones last but sixty days. This makes quite a repair bill, but the tire changes and repairs are readily made without cutting down the average capacity, and with the tonnage put through it is at a reasonable cost per ton for that ore.

The clean-up is made the 1st and 15th of each month and is looked after personally by Supt. Griggs. The first one in October was witnessed by the writer; and as I believe it to be a record breaker, I will give the results that I saw there.

The precipitation is carried out in two rows of five barrels each, which are pretty well loaded with "slimes" at the end of two weeks. These slimes, together with the short zinc, is all washed through a coarse screen into the clean-up tank and the washed zinc returned to the precipitation barrels as usual. After the "product" has settled the wash solution is pumped through a filter press, thus catching all suspended values. The clean-up was then transferred to a large lead-lined acid tank and given a thorough sulphuric acid treatment followed by steam and water, after which the entire contents of tank were pumped into a filter press with absolutely no loss. Then the rest of the sulphate was washed out with a large amount of hot water and air passed through the press to dry it more. The press contents, together with the filter cloths, were placed in a roasting pan and given a red heat for two hours, after which there were 49½ pounds of roasted product. This was melted down with an equal amount of a heavy borax flux and gave 623 troy ounces of bullion, 957 fine in gold and silver. Thus the refined precipitates ran nearly 85% fine bullion. The resulting slag weighed but thirty-two pounds and was fairly clean, assaying 12 cents a pound. The clean-ups are very satisfactory and check close to the mill assays on heads and tails. The amount of zinc used

is eight-tenths pound per ounce of bullion recovered. Seven pounds of lime are used per ton of ore and six-tenths of a pound of cyanide is lost.

The mine, more properly called a quarry, is a large cut. From 3 to 12 feet stripping is taken off as waste. Then there is a 15-foot bed of quartzite that is broken down at the rate of over 100 tons a day by two miners. Common labor does the rest. The cost of mining is probably less than any place in the Hills, and the milling is correspondingly cheap.

The company has recently been reorganized under the same management and additional ground been taken in that contains shale ores of higher value; and as the low-grade quartzite alone paid a fair profit, it makes one of the best cyaniding propositions of its class.

On inquiry at the company's office in Deadwood, W. L. McLaughlin, secretary of the company, kindly gave me the following figures on the cost of milling for the month of October, being about the average:

COST PER TON OF ORE MILLED.

| | |
|---------------------------------------------------|---------|
| Labor, including teamster, carpenter and assayer. | \$0 411 |
| Cyanide | 0 188 |
| Zinc | 0 031 |
| Light and fuel, including water supply expense... | 0 116 |
| Repairs | 0 086 |

Total cost per ton.....\$0 832

These figures bear commendable mention, and, considering the tonnage and character of ore treated, will compare very favorably with the best mills in older cyaniding districts.

Deadwood, S. D., Nov. 22.

Platinum.

Platinum is a gray-white metal, having a specific gravity, when pure, of 21.5, being heavier than pure gold, which is 19.3; but in nature, with the impurities, they are about the same. Platinum, like gold, is soluble only in aqua regia (a mixture of four parts of hydrochloric acid to one of nitric acid), although it differs from gold in this respect, that it dissolves in nitric acid when mixed with six times its weight of silver. Its great value rests on its infusibility at a heat that melts other metals; that, with its qualities of not being attacked by acids, malleability, etc., places it in a realm of non-competition. The value is to-day \$20 per ounce. The value varies with the demand and supply. Should a new use be found for platinum which would increase the consumption, as did the incandescent light, the price would jump up, or should the output decrease the result would be the same. It was first found in some of the placers of South America, mixed with the gold. It is now found in small quantities in many parts of the world.

Until recently all of the platinum produced was from the placers. Platinum ore, platinum in the ledge, was not considered to exist. Ore was not tested for platinum. A Sudbury, Canada, company, in testing their ore, found a little platinum. Since then platinum in the ore has been reported in other parts of this continent, but it is in very small quantity, and cuts no figure as yet in the world's production.

Recently Dr. David T. Day of the U. S. Geological Survey reported that in the Poston gold quartz mine, near Harrison gulch, Shasta county, Cal., kidneys of ore are being found, bearing a gray-looking mineral which he declares to contain platinum.

About 90% of the world's yield of platinum is obtained from the mines in the Ural mountains, Russia, and has been for years.

Brazil stands first among the small producers; United States of Columbia and Venezuela produce an appreciable amount; platinum is found in nearly all of the gold placers in South America. In North America it is not as common—the Pacific coast is its home, but its occurrence is spotted, northern California and the Frazer river, B. C., being the most productive. Australia adds a little to the world's supply.

A placer miner is liable to find it in his sluiceway wherever he works, and in all cases should separate and save it—so many throw it away. It can be sold in the United States—the principal refiners and manufacturers are Baker & Co., Newark, N. J.

Platinum is never found pure, having a small amount of a great many metals, as is shown by analysis:

| | |
|-----------------|-------|
| Platinum | 85.10 |
| Gold | .80 |
| Iron | 6.75 |
| Iridium | 1.05 |
| Rhodium | 1.00 |
| Palladium | .60 |
| Copper | 1.40 |
| Osmium | 1.10 |
| Sand | 2.20 |

Total.....100.00

Refining platinum is more difficult than the other metals. The crude metal is dissolved in aqua regia, taking about ten to fifteen times the weight of acid that there is metal, depending upon size of pieces. When dissolved the acid is mostly evaporated, ammonia added, and the solution evaporated to one-

twelfth of its original volume and allowed to cool; the iridium crystallizes out as the double chloride—which is a dark purple powder—filters off. Ammonia chloride is added, and the evaporation is renewed with a temperature nearly 10°, until the platinum-ammonium chloride separates; the solution is diluted with alcohol and filtered; the platinum salt is placed in a crucible and heated, to drive off the ammonium salt, leaving the black platinum. Care is taken not to heat hot enough to agglutinate the platinum, as it interferes with the subsequent working. The platinum is all put through a sieve and then hammered into an ingot in a mold. Some articles are cast, some are rolled, but the first quality are hammered—it imparts a different quality to the metal. For use in the laboratory the hammered crucible or dish will last longer and give better satisfaction than the rolled; it has no crystalline structure, which the rolled is so apt to assume after being used. The most extensive use to-day for the metal is in the incandescent light—it connects the copper wire with the carbon. Besides this, it is manufactured into wire and apparatus for physical, chemical and almost all scientific uses.

Mohave County, Arizona.

[STAFF CORRESPONDENCE.]

In discussing the merits of Mohave county from the mining standpoint, it has been customary for many persons to start with the premise that this section is rich in minerals, but that operations are handicapped by the absence or extreme scarcity of water and fuel. This is an idea that deserves a little explanation, for it clings to the public mind as a popular supposition that does not quite accord with present conditions. It is true that there is a very slight surface flow of water in any of the stream beds except as the result of "cloudbursts" and heavy rains, which often occur. In fact, this entire section is typically arid, so far as surface moisture is concerned. But the expenditure of a little money in sinking and drifting to develop a water supply has usually met with success, which shows the existence of a stratum of water at a common level in each particular locality. At Kingman the Santa Fe Pacific R. Co. gets an abundant supply at 120 feet depth, there being some twenty to thirty other wells in this town, ranging from 100 to 180 feet deep, from which the water supply is ample. The railroad company has been successful also in obtaining good wells at other stations along its line in this section. At the town of Chloride, situate 25 miles north of Kingman, at the foot of the Cerbat range and on the edge of the arid Sacramento valley, there are a number of wells, from 75 to 120 feet depth, which supply all the water that is required. The chain of mines along the foot of the range near Chloride furnish their own water for steam and mill use. The Elkhart, Schuylkill, Tennessee and Minnesota-Connor are the ones specially referred to. It is possible the supply may not be ample in all of them; but it is shown that the supply is to be had, even though it might cost something to secure it. In these mines the water level has been struck at 100 to 300 feet depth. The Philadelphia-Arizona Co., owners of the Minnesota-Connor group, have found an abundant supply of water by sinking a well at a point 2700 feet from the mine. The water will be pumped from the well and carried by gravity to a cemented reservoir just above their new mill. This is aimed to supplement the supply that comes from the mine.

At Mineral Park several wells with windmill pumps demonstrate a similar condition existing in that historic mountain basin, whose mines yielded high-grade silver chlorides through the '70s. Here a unique and, no doubt, a thoroughly practical, water system has been established by the Aztec Turquoise Co. of New York, under the local management of James W. Haas. It consists of two cisterns, holding about 800 barrels each, blasted out of the solid rock on the steep mountain side, to catch the rain and melting snow that fall upon the area above them. Lateral ditches have been cut in the rocks from the cisterns, so as to drain a larger area. Each cistern is shielded by a hanging roof of rock, the water being first caught in a surface sump which drains through a screen into the cistern. The cisterns are provided with pumps and siphons, attaching to an 1800-foot pipe line by which the water is conveyed to the boarding house and office at a point 800 feet lower. Mr. Haas, who has been a resident of Mineral Park twenty-seven years, thinks the precipitation is sufficient every season to catch by this method all the water that his company will require.

Coming to the C. O. D. mine, situated on the Walapai valley side of the Cerbat range, I find the mine, with 400-foot shaft, supplying the necessary water for steam use, ore concentration and general purposes. It is stated the mine produces about 8000 gallons per day, the mill water being used over and over again, as the supply requires its economical use.

In the Gold Road district, in the River range, but also in Mohave county, sinking in various shafts has developed a strong flow of water at 160 to 180 feet

*See illustration on front page.

depth. At the Berkeley mine, 25 miles south of Kingman, a large volume of water has been pumped from the 112-foot shaft. Similar supplies have been obtained at Cerbat, Oro Plata and elsewhere. What is here written perhaps shows that the water problem here must always be considered in connection with operating expenses, but that it is one that can usually be solved with no great outlay.

As to the fuel question, Mohave county has no coal mines, neither has she more than a scanty growth of scrubby timber, but within the last year or two the fuel oils from southern California's petroleum wells have been adopted throughout this section. Every mine and mill I visited in the Cerbat range has a steam plant provided with oil burners; and the general expression among the operators is that the use of fuel oil is satisfactory and comparatively economical. At present about ten carloads of crude oil a month are shipped to Kingman and Chloride, and about twelve tanks a month of distillate. These quantities are sure to be increased from now on. The manager of the C. O. D. mine and mill, having two 50 H. P. boilers, states that it costs eight-tenths of a cent per H. P. hour for fuel oil.

The Aztec Turquoise Co., in the Cerbat range, near Mineral Park, is a New York company, of which J. G. Doty is general manager. Its holdings comprise eleven claims on Turquoise and Ithica hills, covering a portion of a turquoise belt trending southwest and northeast. Most of the shipments thus far have been from the Aztec mine, on Turquoise hill, where some \$27,000 have been expended in development and equipment. Later work has been confined to the claims on Ithica hill, where the novel water system has been put in which has already been referred to in this. A force of twenty-five men are at present employed by the local manager, James W. Haas, who was instrumental in getting this company to take hold of these properties and develop them. The turquoise is found here in small seams and pockets in the porphyry and quartz, portions of which are considered of excellent quality. It is a character of mining that requires the handling of a large tonnage of material to secure the small quantity of the turquoise gems that are marketable.

Mineral Park basin was the scene of active mining operations from 1870 to 1880, within which period a considerable tonnage of high-grade silver chloride ore was mined and shipped; some efforts were made to mill the silver and gold ores which began to merge into the sulphide stratum. At that time the Keystone mine was one of the principal producers, the company owning it erecting a mill. Its shaft was sunk to a depth of 265 feet, at the dump of which there is a large tonnage of ore. James Uncapher, as one of the owners, has charge of the Keystone at present.

The Woodchopper's Relief mine, belonging to J. W. Haas, is being developed by a crosscut tunnel that will open the ledge of ore some 200 feet below the old workings. At the outcrop and below is a showing of silver-lead ore. The Buckeye, Lone Star, Katie, Estella, Ladybug and Ithica are among the groups that are familiar to old-timers of this camp. The earliest mining here was in 1865. In the '70s Mineral Park was the county seat of Mohave, and an important stage station on the route from San Bernardino, Cal., via Hardyville, to Prescott, Ariz., and Santa Fe, N. M.

WASCOTT.

Mineral Park, Nov. 30.

GOVERNOR BRADY of Alaska says in his annual report that, "from the appropriation of \$325,000 for public surveys, the sum of \$5000 was set aside to commence surveys in the district of Alaska, under the direction of the Commissioner of the General Land Office. Bids were invited for the commencement of this work, but owing to the high rates of transportation between the settlements of Alaska, the price of labor and the length of time required before payment for their services could be received, the deputy surveyors stated that they could not undertake the work, even at the maximum rate fixed by Congress. To remedy this condition of affairs, the Governor recommends the repeal of Section 1 of the Act of May 14, 1898, and urges that the general land laws of the United States be extended to Alaska, so that settlers coming into the country may find laws similar to those enacted for other parts of the Union. He also recommends an appropriation of \$200,000 for public surveys in Alaska, to be expended within the discretion and under the direction of the Secretary of the Interior.

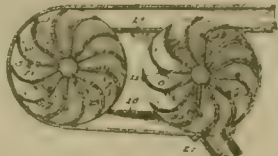
A METHOD of quickly preparing wood for building and manufacturing purposes by electricity is being tried in Austria. The green wood is placed in a large wooden trough, whose bottom is covered with a lead plate, which is connected with the positive pole of an electric battery. A second lead plate covers the wood to be dried, thus forming the negative pole. The wood is then subjected to a bath in a solution composed of 10% resin and 75% soda, and under the influence of the electric current the sap is drawn out of the wood and rises to the surface, the solution being absorbed by the wood. In about two weeks' time after this the wood is dry and ready for use, or the drying can be done by artificial means in a much shorter time. The actual operation in the trough, however, only occupies from five to eight hours.

Mining and Metallurgical Patents.

Patents Issued November 26, 1901.

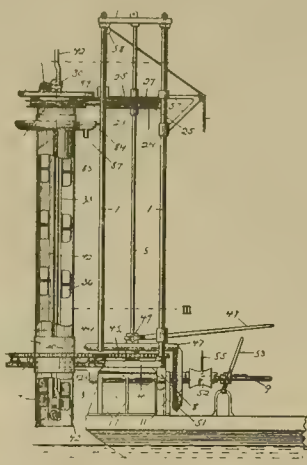
Specially Prepared for the MINING AND SCIENTIFIC PRESS.

WATER MOTOR.—No. 687,074; B. E. Shepler, Clarksburg, W. Va.



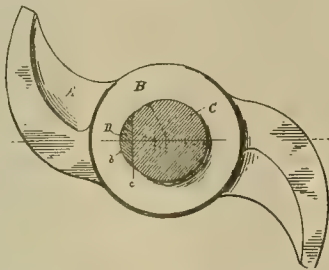
A casing having major end and minor end, a wheel rotatably disposed in each end of casing, the wheel in minor end being fitted close to casing and wheel at major end of casing being spaced downwardly from upper side thereof and close to end thereof, transverse diaphragms in casing disposed above and below plane of axes of wheels, an inlet opening through major end of casing and extending above and below uppermost portion of adjacent wheel and an outlet below wheel in major end of casing.

PLACER MINING MACHINE.—No. 687,387; S. M. Walcher, Kansas City, Kans.



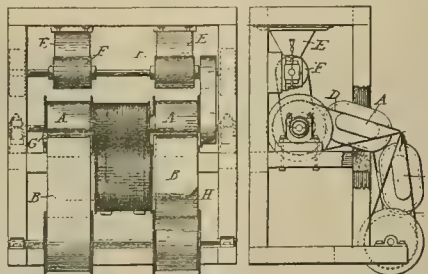
A cylindrical tube rotatable about its longitudinal axis, a longitudinal groove formed in tube nearly from end to end, a vertical frame or tower by which tube is guided, a vertical rotatable shaft supported by the frame, a driving gear wheel keyed to shaft, an extended base of frame having an opening concentric with tube, a sleeve embracing tube above opening, a dog or catch carried by sleeve, a driven gear wheel having sleeve as a hub, and engaging gear wheel on vertical shaft, rollers interposed between extended base and driven gear, rollers entering a groove in gear and thereby holding it in mesh with driving gear.

SELF FASTENING SHAFT KEY.—No. 687,392; M. P. Boss, San Francisco, Cal.



A shaft provided with a plane faced key seat therein, and a hub having a bore for shaft and a simple counterbore extending from end to end, of a plano convex key conforming to key seat in shaft and to counterbore.

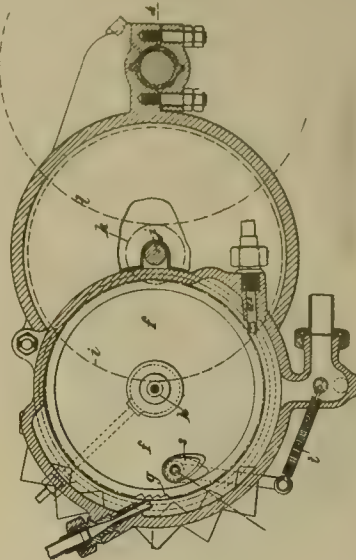
MAGNETIC SEPARATOR.—No. 687,579; F. A. M. Schiechel, Frankfurt-on-the-Main, Germany.



The combination of a pair of magnets having tapered pole pieces, one of the magnets being posi-

tioned horizontally, and the other arranged edge-wise in a vertical plane below and to one side of first mentioned magnet with an intervening space between edges of the pole pieces, an endless carrier traveling around pole piece of horizontal magnet and adapted to deliver material to be treated over and beyond edge of pole piece of vertical magnet; and means for adjusting width of space intervening between edges of pole pieces.

TURBINE.—No. 687,269; A. E. A. Riegel, Pantin, near Paris, France.



A turbine wheel having around its periphery a series of pallets arranged in step form and each consisting of two segments of cylinders intersecting each other in median plane of turbine wheel in form of an acute aris, a shaft forming axis of turbine wheel and extending equal distances on both sides, pinions carried by shaft one on each side of turbine, gears adapted to be engaged by pinions, oppositely disposed inlet nozzles a a' which co-operate with turbine wheel, a valve casing, a plurality of delivery ports in communication with valve casing and a single hand-operated valve for controlling delivery ports, whereby ports may be brought simultaneously into communication with either inlet nozzle and turbine rotated in either direction.

METHOD OF RECOVERING CYANIDES.—No. 687,258; W. Orr, Salt Lake City, Utah.

Recovering cyanide of potassium or sodium from "weak" cyanide solutions and from "fouled cyanide mill solutions" by adding to the solutions sufficient soluble salt of zinc to precipitate cyanide as single cyanide of zinc, next separating and withdrawing precipitated zinc cyanide from solution, next applying to precipitate a solution of alkaline hydrate, next adding to resulting solution a soluble alkaline sulphide, and finally removing precipitated zinc sulphide from last mentioned solution containing desired cyanide of sodium and potassium.

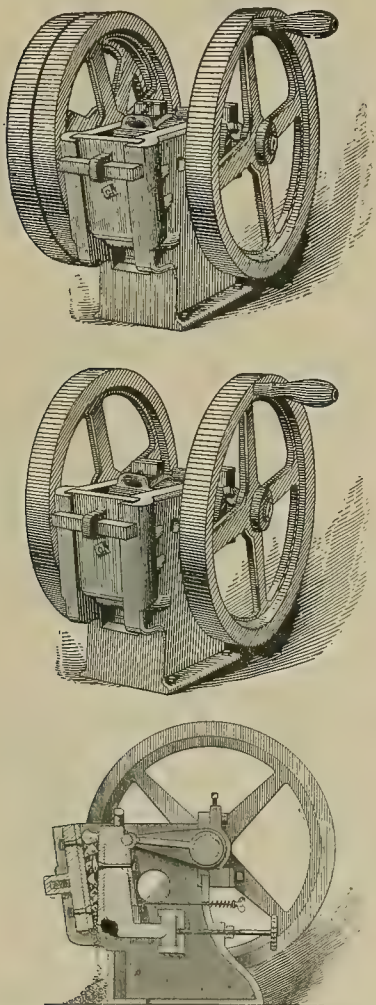
In the reconstruction of a portion of a large office building in Chicago an obstruction was met in the form of six heavy I-beams of 15 inches depth which it became necessary to remove. After a consultation with iron workers it was estimated that the work of cutting the beams in two with hack saws would require the labor of two men working about twelve days, and that special saws would have to be constructed owing to the difficulty of getting access to the beams. Fortunately it ran through the mind of somebody that the tools employed by burglars in opening safe or vault doors by electricity might be employed in this case, and accordingly the experiment was tried with highly satisfactory results. Use was made of a commercial lighting circuit in the vicinity and the beams were burned in two with an electric arc in twelve hours' actual working time. The method employed consisted in simply grounding the positive terminal of the circuit to the iron framework of the building and attaching the negative side to a carbon point of 1½ inches diameter, for contact with the beam. No skilled labor was required, the energy expended was only about 5 H. P. and the expense was slight. The job would have cost about \$100 if it had been done by the ordinary method of iron workers.

NAPHTHA RESIDUE has been used in the manufacture of iron and steel for several years in Russia. This "mazout," as it is called, is a brownish black liquid remaining after the distillation of benzine and kerosene. As American petroleum produces 70% to 80% of kerosene, and the Russian petroleum only 33%, there is a much greater proportion of residue in the latter. Thus, on the average, 100 metric tons of Russian oil produce 3 tons of benzine, 35 tons of kerosene and 60 tons of mazout. This mazout contains 87% of carbon and 13% of hydrogen, and its

heating power is equal to 11,000 calories, while that of coal is only 8000 calories. The Russian engineers figure that for heating purposes $6\frac{1}{2}$ tons of mazout equal 11 tons of coal of good quality. Several methods are in use for burning this fluid, the best being a modification of the Koerting injector, through which the liquid is introduced under pressure into the fire-box, through pipes and reheaters.

Improved Laboratory Crusher.

The Simplex crusher, shown in sectional view in the illustrations, has produced a favorable impression with assayers who have used it for several years. It has recently been improved and some slight changes made in the construction; but in shape and method of crushing it remains the same. Primarily it was a small hand machine, intended solely for laboratory use; but, owing to the demand for a larger machine, it was decided to manufacture a larger size and arrange it for use with power. The small hand machine continues to be most in demand and the sales are constantly increasing. The manner of crushing is simple and effective. As illustrated, the motion is



imparted to the vibratory jaw by means of an eccentric on the shaft. The heel of this jaw rests in a brass box, and the motion of the lower portion is the arc of a circle, always expelling the crushed material. Adjustment is secured by means of two set screws that press on the brass box holding the heel of the vibratory jaw. This machine may be adjusted to crush from 2-inch to 10-mesh. With the smaller size the manufacturers say that it is possible to crush about 50 pounds an hour by hand and 75 pounds by power, and that the larger size will crush about 75 pounds an hour by hand and 125 pounds by power. They assert that in actual operation by successive gangs of "peons" over a ton of ore has been crushed from 2 inches to $\frac{1}{4}$ inch with the larger machine in a day's work.

The Simplex ore crusher has stood severe tests in various portions of the world, and is designed to satisfy all requirements for a laboratory crusher. The manufacturers are F. W. Braun & Co., Los Angeles, Cal.

Mine Superintendents.

Mine owners and others who realize the vital importance of having a capable superintendent are sometimes handicapped by the fact that they live at a distance and rarely have more than a superficial knowledge of the business. This makes it hard to select good superintendence or to judge the quality of what they do secure. To all business men profit or loss, success or failure, is the final and decisive test of ability. However reliable this test may be when applied to those responsible for an investment, it is certainly not decisive for the others who are

carrying out its details. An attorney who has to handle a bad case may display such ability as to arouse the admiration of other lawyers. Unless he wins the case, however, all this will probably be lost on his client. To a mine owner likewise, profit or loss is generally the measure of his superintendent's ability. This individual is apt to have a bad case to start with. In many cases the chances are against success and the investment should never have been made. Even paying mines are sometimes bought at an enormous overvaluation. It is a hopeless task to recover the capital, to say nothing of any net profit afterwards. But whether the mine is good or bad, and whether the superintendent is able or otherwise, he understands one thing clearly. His employers will not ordinarily recognize any skill and economy he may show, and he will be judged only by results. While this is an incentive to make the mine pay, it is hardly calculated to draw out his best powers. However skill may improve the chances, finding pay ore is largely a matter of fortune. This element of chance may disappoint the best planned work. He will get no credit for the latter. Whatever the cause the odium of failure will be the same. Why, then, should he strain himself or do anything to shorten his position? If the mine is already paying, there is still less reason for efforts which will not be appreciated. All that is necessary is to take it easy and let his reputation grow with the dividends.

A peculiar feature of this mining business is the wide range of ability among men who occupy high positions. In ordinary lines of manufactures or commerce competition is close and keen. This and the constant interchange of information as to the best methods keeps every manager, superintendent and foreman close up to an average standard. This is not true in mining. In addition to the peculiarities previously mentioned, business competition does not exist. In mines no two are alike. Moreover, they are more or less isolated. Superintendents and foremen are not subject to close competition and criticism and comparison of their work with that of others. Hence men found in charge of large mining operations vary strangely from those who have the highest qualities of skill and judgment to others who have none. The industry as a whole, and particularly the large communities dependent upon it, sometimes suffer from errors of all kinds. Only those who have occasion to visit and compare mine operations in all quarters can realize how frequently mistakes recur.

Robins Belt Conveyors in Stamp Mill.

The Homestake Mining Co. at Lead, South Dakota, have installed three Robins belt conveyors, each 167 feet long, at their De Smet shaft-house. The belts receive the ore through chutes in the bottom of the bins, the leading points being close together. The conveyors then diverge from this center and deliver the ore into the 100-stamp mill. The accompanying illustrations show the conveyors themselves and the three bridges which support them. Each belt carries about 160 tons in twenty-four hours. They run at moderate speed and are driven from a single shaft at the discharge end, requiring about 3 H. P. each. While the ore is in transit on the belts, it is sorted, and small pieces of wood and chips are picked out from it. These come from broken timbers in the mine, and formerly greatly obstructed the discharge from the screens. By keeping them out from the mortars from ten to twenty tons more per day are now crushed. The three belts are fired by one boy. Further information may be obtained from the Robins Conveying Belt Co., 15-21 Park Row, New York.

Novel Dam Building.

At Dobbins, in Yuba county, Cal., the Bay Counties Power Co. is building an immense dam to create a storage reservoir to be used in connection with its North Yuba electric plant. The dam, which is an earth fill, will, when completed, be 1400 feet long on top, 97 feet high, with a base over 400 feet thick. The face of the dam will be built up with scrapers, the balance of the material being hydraulicked into position. The water for this purpose is obtained from the stream in which the dam is being built, and is taken out of the stream below the dam. Two centrifugal pumps, operated by electric power from the company's plant at Colgate, on the North Yuba, $2\frac{1}{2}$ miles distant, force the water through a 15-inch pipe and apply it to the bank 100 feet above with a pressure equivalent to 250 feet head. Three hundred miners' inches of water is used,

and as the stream flows only about 5 inches of water, it is necessary to store the water and use it over and over again. The site of the dam is lighted by electricity, enabling the work to be carried on night and day.

Philippine Miners' Memorial to Congress.

The American Mining Association of the Philippine Islands has sent the following memorial to Congress relative to mining laws for the islands:

WHEREAS, The conditions now existing in the Philippine Islands relative to mining are such as to practically prohibit the development of mines, and will so continue unless the United States mining laws are extended to this Archipelago; and

Whereas, Many American miners have been prospecting for the past two years, and have located claims under the United States mining laws, and organized mining districts, similar to those that have been organized in the mining States and Territories of the Union, many of whom have done considerable development work on their said claims, the said prospectors and miners continuing to locate mining claims, expecting the Congress of the United States to extend the United States mining laws to these islands, and that their claims now located will be recognized by the Congress of the United States; and

Whereas, It is a well known fact that the Spanish mining laws in the Philippine Islands have been practically a failure, as far as the development of the mineral resources of the said islands is concerned, there having been practically no prospecting done until the American miners, who are here, and who are the pioneers in prospecting and mining, have gone over these islands and discovered valuable mineral deposits; and

Whereas, The United States mining laws, as is well known, have been the cause of developing the great mineral resources of said country, and the same rule will apply here, provided that Congress shall extend said mining laws to this Archipelago; and

Whereas, The prospectors and miners now in these islands, numbering somewhere between 1500 and 2000, most of whom are ex-soldiers, are now out in the hills and mountains prospecting and developing their said claims, with the expectation that Congress will recognize their said locations and extend the United States mining laws to these islands, and thus develop the great mining resources, which will not be developed unless the United States liberal mining laws are extended here; now, therefore, be it

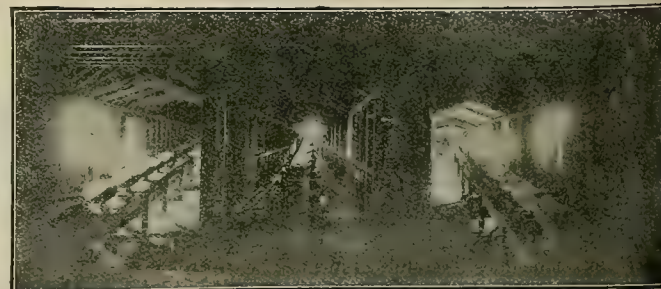
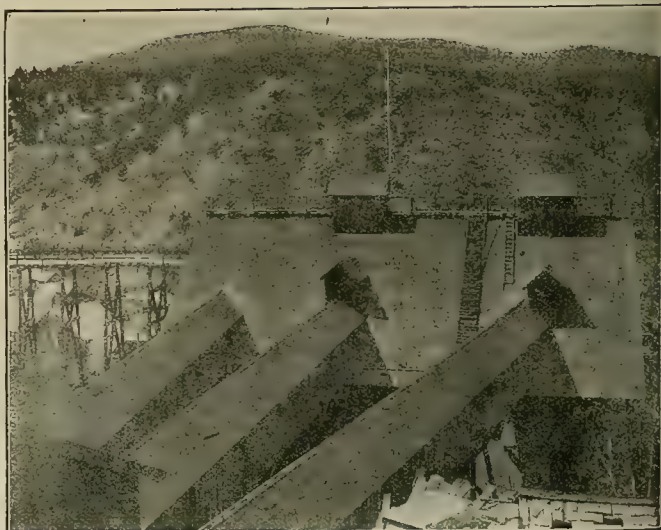
Resolved, That we, the American prospectors and miners, now in session in the city of Manila, do hereby resolve and petition the Congress of the United States to pass an Act extending the liberal mining laws of the United States to the Philippine Islands and to recognize their claims now located, and that the Civil Governor and the Philippine Commission be requested to embody a copy of these resolutions in their report to Congress, and that the Philippine Commission recommend to Congress that the United States mining laws be extended to said islands, and that a copy of these resolutions be sent to the Civil Governor of the Philippine Islands, to the Philippine Commission, to the President of the United States, to the Secretary of the Interior, to the Congress of the United States and to such individual members of Congress as may be reached by mail.

[Signed.]

J. B. EARLY, President.

ROBERT MILLS, Secretary.

—Manila, P. I., Oct. 13, 1901.



MINING SUMMARY.

Specially compiled and reported for the
MINING AND SCIENTIFIC PRESS.

ALASKA.

JUNEAU.

The Treadwell mill, it is reported, is to be operated by electric power from the Sheep creek water power. A large generating plant is projected on that stream, the electric power to be conducted across Gastineaux channel by cable, a distance of 4 miles, to the Treadwell plant. The Treadwell Co. operates 1000 stamps, partly by steam, and with the substitution of electric power from water the cost of milling ore will be reduced.

ARIZONA.

COCHISE COUNTY.

(Special Correspondence).—The Copper Glance M. Co. have their two-compartment shaft down 110 feet, and shaft No. 2, a single compartment, 4x6 feet in the clear, is down 45 feet. The company at present employs sixteen men. The property is 7 miles southeast of Bisbee on the new El Paso & Southwestern Railroad, which recently established a station at this point that is named Glance. C. L. Beckwith is manager and C. C. Warner of the Copper Queen Con. M. Co. is Supt.

Bisbee, Nov. 30.

At Pearce the Commonwealth mill is running at full capacity.

GILA COUNTY.

The Grey mine, at Globe, is one of the principal claims of the United Globe Mines Co., in which Phelps, Dodge & Co. of New York are principal owners. Supt. N. S. Berray commenced sinking a three-compartment shaft on it on Feb. 20. The work has now reached the ninth level at 650 feet and will be continued to the tenth level at 775 feet. It is expected to make this within a year, or by Feb. 20, 1902.

MOHAVE COUNTY.

(Special Correspondence).—The C. O. D. mine is situated on the Wallapai valley side of the Cerbat range. It has been worked periodically for many years, and is credited with a production of nearly a million dollars. Within the last year the property was acquired by the C. O. D. Mines Co., of which Henry S. MacKay is manager. The vein cuts through a granite formation in an easterly and westerly course, and has a dip northward. It is approximately 26 feet between the walls, there being a shoot of ore 4 to 10 feet in width in a quartz gangue. This shoot is well opened at the 300 level. The ore is composed of an iron and lead sulphide, carrying gold, silver and lead values, and seems well suited to concentration. Some shipments of sorted ore ran 55% lead. The company has erected a concentrating mill of forty tons daily capacity, provided with crusher, trommels, high-speed rolls and Bartlett tables. It is stated that the mill will be enlarged and a shaft house and sorting room built. About one-tenth of the output will be shipped crude and nine-tenths milled. A considerable tonnage is piled up on the dump.

The same company has acquired the Prince George mine at Stockton Hill and the Golden Gem at Cerbat. On the former a shaft is being sunk to further open an ore shoot. On the latter work is in progress where there is said to be ore running 10 ounces gold and 100 ounces silver to the ton.

Kingman, Nov. 28.

J. W. Roberts has bonded the Night-hawk mine from G. M. Bowers and the Omega mine from F. S. Dennis and P. Caffery of Kingman. The mines are at Layne Springs. The Nighthawk is opened by several tunnels, the lower of which is now in over 1400 feet on the ledge. Mr. Roberts is representing Los Angeles, Cal., people.

W. F. Grounds, owner of the Clay Springs group of mines near Kingman, says the tunnel on the vein is now in 200 feet and is still in the ore shoot struck 100 feet back, with a back of gold ore overhead of 150 feet. As soon as he has the vein more fully developed, he says it is his intention to put in a mill.

The Leonora mill, at Hardyville, has been started up on a trial run. The ore runs about \$35 per ton and the mill is said to be saving a high percentage of the values. It is the intention of the company to repair the hoisting plant at the mine and start up work. The mill, it is believed, will handle the ores down to the water level. When below water, where sulphide ore is expected, a concentrator is to be added to the mill.

Denver, Colo., Salt Lake, Utah, and Los Angeles, Cal., people, headed by O. P. Posey, C. K. McCornick and W. Bayly, have bought the Gold Roads mine from J. Burkhardt and B. Erickbrecher of Los Angeles for, it is reported, \$500,000. The property comprises six claims 25 miles

north of Kingman and about 9 miles from the Colorado river. The vein averages 14 feet in width, carries an average value of \$20 gold per ton, and has been opened to a depth of 200 feet. The buyers propose to immediately equip the property with a mill plant.

SANTA CRUZ COUNTY.

The Pena Blanca mine, at Nogales, J. S. Hurst manager, has been a steady producer of lead-silver ores for the past three years. The company at present operating the mine recently bought it. They contemplate the erection of a 25-ton smelter about Jan. 1. The ore, it is claimed, runs 62% lead, fourteen ounces silver and \$4 gold.

YAVAPAI COUNTY.

The Monarch G. & C. M. Co. is opening up new bodies of ore on their mine near Jerome.

Supt. Wombacher says assays from average samples of the ore body in the El Capitan gave returns of over \$200 a ton, the shoot averaging 18 inches in thickness for 75 feet. The site for the new mill is graded and ready for construction.

E. D. Treadwell is superintending the sinking of a shaft on the Iron Queen mine near Prescott. The mine has been worked several years for iron ore, which was used for flux at the Big Bug smelter. At a depth of 150 feet a small body of native copper ore was struck and Mr. Treadwell is now developing it as a copper mine.

CALIFORNIA.

ALPINE COUNTY.

Supt. Curtz of the Loope mines, near Monitor, has shipped fifteen tons of concentrates to the Selby Smelting Works. There are about forty men employed at the mines. Mr. Curtz expects to build a smelter and put in electric power to operate the mill next spring.

AMADOR COUNTY.

(Special Correspondence).—The Plymouth Rock G. M. Co., J. H. Durst manager, is running a tunnel, putting up a hoist and erecting office buildings, etc. The property consists of eighty acres patented land 3 miles north of here.

Plymouth, Dec. 3.

CALAVERAS COUNTY.

The Pence ditch has been completed and is now ready for the turning in of the water. Active work has been commenced on the gravel deposits at Round Butte, near San Andreas. The camps have been removed to the Treat ditch, which will be cleaned out to carry water to the Johnston gravel mines.

EL DORADO COUNTY.

The California Slate Manufacturing Co., capital \$100,000, with works at Placerville and office San Francisco, has been incorporated. The directors are F. S. Chadbourne, H. F. Ingersol, F. S. Ingersol, M. Glaser and H. S. Martinez.

FRESNO COUNTY.

(Special Correspondence).—Maj. Fred A. Clark of San Francisco has been looking over the hydraulic work of the Fresno Placer M. Co., Sycamore creek, Kings river. The ground had been worked in a crude way for many years, but the company is putting in an improved plant and is now placing eighty tons machinery for hydraulic elevators, and is building a ditch from Big creek, a distance of 5 miles, to give 300 feet head. Much of the gold is found in nuggets and is of remarkable purity, being worth \$19.50 per ounce.

Kings River, Dec. 1.

INYO COUNTY.

G. McConnell, J. J. Gunn, W. T. Grant and A. F. Mairs have bonded their group of mining claims, situated in the Ubehebe district, to W. O. Crosby of Boston, Mass., for \$125,000. Ten per cent is to be paid on or before Dec. 31st, balance to be paid on or before twelve months.

W. Moore has bonded a claim at Darwin for \$3500—\$500 cash down.

N. Breedin of Bakersfield has a bond on a claim near Tibbitts, belonging to G. D. Calvert, C. Walter and D. P. Hargis, at \$15,000.

The bond of W. T. Stevenson on the Flagstaff mine, at Swansea, owned by F. Meyers, has been assigned to J. E. Lutz of Oakland.

NEVADA COUNTY.

At the Home mine, near Grass Valley, ten additional stamps added to the 20-stamp mill have been started. The ledge varies from 8 to 25 feet in width. The pay shoot is said to be extensive. About thirty men are employed under Supt. D. J. McFall.

Arrangements are being made for starting up the National mine, near Graniteville. The mine is owned by Mrs. McKilligan and others and has been bonded to a company represented by J. H. English of Nevada City. In former years the National was a good producer.

G. A. Nihel has completed the erection of the 10-stamp mill on the mine at

Meadow lake, operated by Capt. Ord and others. He is now building a covering over a tramway from the mine. Besides the mill, a small smelting plant has been built, which, it is expected, will reduce the ore that can not be worked in the mill.

PLACER COUNTY.

The Rawhide quartz mining company has commenced installing a new 10-stamp mill at its mine on Texas hill, near Blue Canyon.

The dam on the north fork of the North Fork and 2500 feet of ditch have been completed and work on the flume is in progress. The 3-stamp mill at the mine is running steadily. The ore is taken from the mountain side by means of an aerial ropeway with self-dumping buckets. The quartz at present runs from \$7 to \$10 per ton from a large ledge. The new mill will have a capacity of thirty tons in twenty-four hours and will be supplied with four concentrators.

SACRAMENTO COUNTY.

Construction of the dredger at Teat's Flat, near Folsom, has been delayed by the difficulty in obtaining the lumber from Oregon. W. R. Bean of the Risdon Iron Works of San Francisco is superintending the construction.

A contract has been let by the Colorado Pacific G. D. Co. for the construction of another dredger at Mississippi Bar at Folsom.

The Natoma Co. has agreed to sell to R. G. Handford of San Francisco 260 acres of dredging ground near Folsom at \$225 per acre.

Preparations are being made to run wires from Folsom to Mississippi Bar to furnish electrical power to operate the dredger now there, and also the one that is to be built there.

F. and Jennie A. Cox and C. W. and P. Clarke have sold to the Colorado Pacific G. D. Co. 100.85 acres in Mississippi Bar, giving the company control of the entire acreage of the bar.

The prospecting drill which the Ashburton M. Co. has had in operation at Wheatland for several months has been brought back to Folsom.

SHASTA COUNTY.

The electric power plant of the Keswick Electric Power Co. on Mill Seat creek, 29 miles southeast of Redding, has been started into operation. The company is furnishing light and power to Redding and is to furnish light and power for the smelting plant of the Mountain Copper Co. at Keswick, distant 34 miles, and for its Iron Mountain mine, distant 48 miles. The Keswick Electric Power Co. is composed principally of San Francisco people, H. H. Noble being the president and H. L. Shannon general manager. Among other improved devices in the power plant are static interrupters, which provide safety to wires and plant in an electrical storm. There are also six automatic gates in the pipe line, which are a new thing. They act as safety valves, opening and discharging water from the line when the pressure reaches a certain excess. In addition to furnishing light and power to the copper mining and smelting plant of the Mountain Copper Co. and to Redding, the company will light the town of Keswick, and in the spring a 27-mile line will be run to Red Bluff and to the Maywood colony at Corning and the Stanford ranch at Vina.

The Mountain King and Mountain Queen quartz mines, on Soda creek, near Dunsmuir, are being developed by P. F. Furlong and T. S. Kaney. The Mountain King has been opened by tunnel in 460 feet and shows a 4-foot ledge which is claimed to average \$25 a ton. The Mountain Queen tunnel is in 60 feet and shows decomposed free-milling rock. Lumber and all material are on the millsite for the building of quarters for the miners and an arrastra. It is proposed to get out ore which will be packed down to the arrastra for working.

A Mr. Mitchell, representing Salt Lake City, Utah, people, has bonded the Oak group of claims, near Copper City, from R. E. Collins, S. Stewart, W. Blagrove and W. Ellis, who have been doing development work on them. The bond is for one year at \$15,000, a payment being made down. Mr. Mitchell has arranged to continue and extend the development.

SIERRA COUNTY.

The owners of the Dudley gravel mine at Forest have incorporated as the Corotoman M. Co., with office in Los Angeles, and capital \$200,000. The directors are M. C. Green and Helen H. Green of San Diego, Cal., and W. R. Green, H. A. Green and E. B. Spencer of Los Angeles, Cal.

The Harpington G. M. Co. has been incorporated to operate the Tempest and Capital mines, near Camptonville, with office in San Francisco. The capital is \$75,000, and directors are W. E. Rowlands, H. M. Owens, H. Jones, F. J. Hennessy and T. C. West, of San Francisco.

SISKIYOU COUNTY.

(Special Correspondence).—The mill of the Yreka M. & M. Co. at Rollin (in the Salmon river country), was started up on the 23d ult. It is expected to crush 10,000 tons of ore from the Mountain Laurel mine this water season. Last year's season 6000 tons crushed netted a little over \$10 a ton. The pumps, hoist and power drills at the mine are operated by compressed air, using sixty pounds pressure. The company will put in a suspended cable tram next spring to transport ore from the upper claims—the Ohio, Flora Blanche and Aida—to the mill.

Rollin, Dec. 1.

H. Mattern of the Wabana Co., at Henley, is having a 100-ton test made at the Badger State mill, from their new find on Rocky gulch. They claim to have 1000 tons of ore blocked out, with 6 feet of good ore in the face of the tunnel. A wagon road will be constructed from the mine to their mill site, on Klamath river, where a 10-stamp mill will be erected, run by water power.

The Golden Eagle Co., G. Rymal Supt., has 6 feet of \$15 rock. This is a recent find, their present depth being about 100 feet.

Roberts & Jilson Co. have increased their force to thirty men. They have recovered the lost pay shoot, and propose to block out from now until March 1st, when the mill and mine will start up with a full force.

E. F. Olden of Colorado has bought the Chaney, Sutphan and Higgins mine and mill on Hungry creek for \$1600 cash.

San Francisco men, who recently bought some mining ground at Oro Fino, have cleared \$900 over all expenses in fourteen days on crushing rock from the claim. The ore body is about 75 feet wide, consisting of a mass of small quartz seams in a dike rock, all of which is taken out and milled.

TRINITY COUNTY.

The Chloride-Bailey mines at Dedrick are being equipped with a new mill. It has two 5-stamp batteries and a complete concentrating plant. The machinery will be set up at the mouth of the lowest level on the property, and at a point where the entire output of ore can be handled by gravity and the mill operated by water power. The mill now in use, having ten stamps, is situated well up on the mountain.

TUOLUMNE COUNTY.

The Tansy pocket mine at Sonora, operated under lease by Birney, Munroe & Launer, has recently produced some rich quartz. It is reported that 1050 pounds which was shipped contained \$25,000 in gold and that 148 pounds in another lot contained \$8400.

A trial crushing of ore from the Little Wonder mine, at Big Oak Flat, Mr. Roberts Supt., paid \$12 a ton. The owners are considering the putting up of a mill.

W. A. Nevills and wife are reported to have sold to W. H. Martin the New Albany quartz mine and a 10-stamp mill, also the north extension of the New Albany and the New Albany South quartz mines at Carters, and also the New Albany ditch.

The eighty acres of mining ground at Sonora, recently bonded by Doyle Bros. to San Francisco parties, covers a portion of Table mountain and contains a deep channel, the gravel of which is known to be rich. A shaft has been sunk on the property.

COLORADO.

BOULDER COUNTY.

Work has been commenced on the 100-stamp mill of the Boulder County Co., near Eldora. In doing the development work, Supt. Lake has taken out so much ore that the company has been forced to build their mill this winter, instead of next summer, as originally planned. The mill will be erected at the mouth of the tunnel, which will in about 4000 feet give a depth of about 1000 feet under the present workings.

CHAFFEE COUNTY.

The Little Annie mine, near Buena Vista, has been bonded by J. Kloes, who has been shipping ore from it for the past three months. There is a small mill on the mine which it is proposed to remodel and add machinery to so that the ore can be concentrated at the mine before shipment.

CLEAR CREEK COUNTY.

A strike has been made in the Kitty Owsley property in East Argentine, which is being developed under bond by Schauer & Noone. Sixteen inches of ore, assaying 73% lead, twenty-seven ounces silver and \$4 in gold, have been opened in a winze 15 feet below the main tunnel level.

The Newhouse tunnel, driven with but one shift of drill men at work in the heading, is expected to be advanced for the month of November 270 feet. The management is experimenting with a loading machine to remove the broke

rock and several tests have already been made. The machine is about 10x10 feet in size and 5 feet high. It requires four engines to operate it, air being used. It has been found necessary to put in stronger engines, but the shovel has otherwise proven a great success, so that it is believed to be now only a question of building the machine strong enough.

The new tunnel level on the Sporting Times, at East Argentine, has struck ore, a large amount of lead having made its appearance through the gangue and quartz. Manager Shroff believes he has struck the edge of the ore shoot.

FREMONT COUNTY.

The owners of the Isabella mine at Tac-lamur have installed a large hoisting engine on the mine. The property is owned by the Tremont Mines Co., of Boston people. The ore carries lead, copper, zinc and silver, and is uncovered to a depth of over 200 feet. The company, it is said, will probably build a concentrator at an early date.

GILPIN COUNTY.

Mrs. E. M. Baldwin of Chicago, Ill., has sold to the National Tunnel M. & M. Co. a two-sixths interest in the Illinois, Merimac and Lexington lode claims in Lake and Russell districts, near Central City, for \$10,000, and has also conveyed to the company a group of fourteen claims and a three-fourths interest in the Everett lode, all situated in Gregory, Lake and Russell districts, for \$75,750. The company has also bought from A. Oeschler and F. W. Stevens a one-third interest in the Illinois, Lexington and Merimac lodes. The company during the past year has been working a portion of the property through the Wabash and National tunnels from Black Hawk. The company is composed of Chicago people, with C. W. Baldwin as one of the principal stockholders. J. Brohl of Central City is the mine foreman at the National tunnel.

The Butler Con. M. Co. has been incorporated at Central City with G. W. Mabey, Jr., as president and R. Codman, Jr., secretary and treasurer, to operate the Butler property in Eureka district. The shaft building will be overhauled and another plant of machinery installed. The shaft is down 340 feet.

The Electric Spark G. M. Co. has been incorporated at Central City, capital \$200,000, by J. A. Yawger, O. D. Reese and W. A. Rogers, to operate the Grace Darling group of claims in lower Lake district, of which J. A. Yawger of Central City is in charge.

The Alps mine, Central City, has commenced shipping smelting ore running from \$125 to \$150 per ton. The mine is being worked by Central City people, J. Williams manager.

The Mammoth G. M. Co. states that it will resume operations on the Great Mammoth lode at Central City at an early date. The shaft, now 700 feet deep, will be sunk below the level of the Waterbury tunnel, which will be driven ahead into the workings to provide ventilation. W. H. Paul is Supt.

GUNNISON COUNTY.

The Colorado Smelting & M. Co. is pushing development in the Pitkin district. Five tunnels are being driven into the mining ground, to make 2000 to 3500 feet, cutting the formation as deep as 1600 feet. A. H. Reynolds is manager.

The Belzora-Bassick M. Co. of Michigan people owns a group of thirteen claims at Pitkin on which it has pushed development for several months. W. S. Henderson is manager.

LAKE COUNTY.

The Canterbury M. Co. has received a settlement for its first shipment of ore, made on a contract which gives the company a payment of \$2.36 per ton, on board cars at Leadville, the buyers paying treatment and transportation charges. As there is no water to be handled, and as the ore body is large and of uniform value, the product is mined and placed on the cars for not to exceed \$1 per ton.

The Phoenix M. Co. at Leadville is producing now about 175 tons of manganese iron per day, and expects soon to increase it to 200 tons per day. About ninety men are employed and the force is to be increased. The Colorado Fuel & Iron Co. is taking the production.

TELLER COUNTY.

The mill and smelter returns for Cripple Creek ore treated during the month of November are as follows:

| Colo.-Phila & Stand-Tons. | Av. | Value. |
|----------------------------------|--------|--------------|
| ard..... | 26,000 | \$30 780,000 |
| Union..... | 5,000 | 29 145,000 |
| Dorcas..... | 2,500 | 35 87,500 |
| Economic..... | 4,575 | 30 137,250 |
| Smelters and miscel-laneous..... | 21,000 | 70 1,365,000 |

Totals.....59,075 \$2,514,750

The Colorado Mines Con. Co. has been incorporated with C. S. Rickey, H. C.

Shimp C. R. Buschner, J. McConaghy, E. C. Sheldon, I. H. Glezen and B. Cunningham of Colorado Springs as directors, to mine at Cripple Creek. The capital of the company is \$2,000,000.

A steam hoist is being installed on the south block of the Teutonic mine, near Victor, at a 160-foot shaft, by the lessee, Mrs. Sharp of Victor. The shaft has about 60 feet of water, and after its discharge prospecting will be started for the flat vein of the Damon and for the Midway-Londonderry bonanza shoot. On the north block of the Teutonic, Kane & Co. have begun prospecting for the Damon shoot.

Eighteen inches of ore that assays \$192 in gold to the ton has been struck by A. Kenyon of Denver on the Bull hill lease after a few weeks' operation. The find was made in the main workings of the Atlanta near the Findley, and at a depth of 475 feet. The Gilpin & Cripple Creek Co., owner of the property, in prospecting incidentally ran within a few feet of where Kenyon has made a strike.

Assays running all the way from \$400 to \$2000 per ton are reported as being had from the 200-foot level of the Trachyte main workings, extended into the Deadwood territory of the New Zealand Co. The screenings from the ore body give an average of about \$200 in gold, while the coarse rock returns \$50 per ton average. The pay body is from 1 to 3 feet in width, and will average close to the latter.

It is said there is an increasing tendency on the part of mining companies to lease idle or undeveloped territory in Cripple Creek district. Nearly all the leases granted lately have been for not less than eighteen months, and some for three years. The royalties are made lower also, a flat royalty of 20% being the maximum asked. The greatest number of lessees on any one company's property at the present time is on the Gold Hill of the Anaconda Co. There are twenty-one working on the different blocks, and fifteen of them are producing ore and paying royalties into the company's treasury. Nearly every strike of importance made in November is credited to lessees. Among these are the finds of Terrill & Burke on the Colorado Boss, Barton & May on the Rhinoceros of the Gould Co., Brown and others on the Lone Star of the Anaconda Co., Lund, Mars & Bachman on the Rose Maud, Anderson on the Climax No. 2 of the Little Puck Co., the Cripple Creek M. & L. Co. on the Deadwood, Thompson and associates on the Pinnacle Co.'s ground and the Helen B. lease on the Arapahoe.

IDAHO.

ADA COUNTY.

In the Neal district near Boise the Elmore group and other promising claims will be developed this winter. The Sunbeam and Sunshine claims are to be developed by A. C. Fralick and W. L. Grose, who have bought them from Corder & Beck. The Ainslie stamp mill has been leased and will be kept in operation all winter. The Daisy extension, known as No. 13, bonded by J. J. Deming, W. Alley, W. McKinley and A. C. Fralick, is being developed by a shaft and the ore body is looking well.

IDAHO COUNTY.

Dunn & Wilkinson, stockholders of the Wild Rose mine, at Pierce City, have brought out twenty-seven pounds of gold bullion, valued at \$4000, the result of a 30-day run by the 2-stamp prospecting mill. The mine was discovered May 25, 1901, and since then there has been taken out over \$9000. The shaft has now reached a depth of 71 feet and the high values of the upper levels continue. The work of development will be continued throughout the winter.

F. Richardson and D. J. Brown of Boise, owning sixteen claims in the Thunder Mountain district, have arranged to sell them to a company represented by W. White.

P. B. Armstrong has completed the transfer of the Banner mine, at Florence, from the old company to the Florence G. M. Co., the new incorporation, owned in New York City. The new company has sent to the mine eighteen teams loaded with supplies and will continue development during the winter.

LATAH COUNTY.

The Golden Rod M. Co. has been incorporated at Moscow, with F. L. White president, F. Jenkins vice-president and manager and F. E. Cornwell secretary. The capital is \$100,000.

LEMHI COUNTY.

It is reported T. Keeting of Gibbonsville, Mont., and associates have bonded the Dark Horse group of mines in the main range of the Rocky mountains, near Gibbonsville, close to the Montana line. A force of men has gone from Salmon City to work on the property. The vein is 5 feet wide and is said to have a pay shoot which aggregates values of \$140 gold, silver and copper to the ton.

SHOSHONE COUNTY.

The Humming Bird M. Co. of Burke has elected W. Graham president and M. J. Farrell secretary, treasurer and manager. Work has been suspended in the upper works and the lower tunnel is to be worked on all winter.

The Atlas C. M. Co. has been incorporated in Spokane, Wash., to work a group of claims on the south side of Stevens peak, near Wallace. The capital is \$1,000,000 and directors are S. Douglas, F. S. Earnest, L. Wood, J. W. Douglas and B. D. Overholt.

The Gold Standard M. Co., Ltd., has been incorporated, with office at Wallace and capital \$1,000,000. F. Houle is president and R. V. Kuhn secretary. The purpose of the company is to work a placer mine on Pony gulch, near Delta, by the hydraulic method.

MONTANA.

FERGUS COUNTY.

The New Year group of mines, J. Meredith, manager, at New Year, 14 miles northeast of Lewistown, operated by the New Year G. M. Co. of St. Paul, will start their milling plant about Jan. 1, 1902. The plant has a capacity of 250 tons daily, is lighted by electricity and heated by steam.

The Great Northern M. & Dev. Co. has let a contract to Gulden Bros. for sinking a shaft 500 feet on the Standby claim, one of the Gilt Edge group. The shaft will strike the tunnel now being run into the ore body.

J. R. Cook has incorporated the Abbey mining group near North Moccasin; capital \$1,250,000. E. Johnson of Portland, Or., F. S. Ackley, J. L. Leavel and J. Wilmot are the other incorporators. A large amount of development work has been done on this group.

Lyons & Helsing will erect a 5-stamp mill on their mine near North Moccasin this winter and will commence mining in the spring. Their ore is free milling and assays from \$3 to \$5 per ton in gold.

The King-Barnes mines, near North Moccasin, has produced about \$20,000 in gold bullion since the commencement of work, five weeks ago.

GRANITE COUNTY.

The Highland M. & M. Co., recently incorporated by J. J. O'Meara, W. E. Deeney, G. Nissen, J. P. Brown and J. F. Duffy of Butte, has bought the 10-stamp mill of the Red Lion Co. and is now transferring it to its own mine in the Red Lion district on Flint creek, near Phillipsburg.

LEWIS AND CLARKE COUNTY.

Fire destroyed the Peck-Montana concentrator, located near Helena, on the 30th ult. The loss is \$160,000; insurance \$70,000. The plant was owned by the Missouri Power Co. and the Helena & Livingston Co. It is to be rebuilt.

A strike of 2 feet of good ore has been made in the 250-foot level of the Overland mine, near Helena. The mine is under bond to Mrs. A. M. Esler, with F. Esler as manager.

R. A. Panches' mine in Greenhorn copper district, near Helena, is regularly shipping iron ore to the East Helena smelter and copper ore to the Butte smelters.

It is reported that a new shoot of ore has been struck in the Howard mine, at Helena.

The force at the East Pacific mine, at Winston, has been increased to ninety-five men. The shipments from the East Pacific are nearly a carload a day.

NEVADA.

ELKO COUNTY.

The new mill for the mines of the King Solomon M. Co. at Charleston is under construction. The mines of the company, which is controlled by Ogden, Utah, and Lafayette, Ind., people, with W. C. Alexander manager, have about 3000 feet of development work done, showing the ore averaging about 20 feet between walls. In the main workings the ore shows an average of \$10 gold and from twenty to forty ounces silver. The mill will be of fifty tons capacity, arranged to be increased to 200 tons. A sawmill is being erected on the ground.

LYON COUNTY.

The Dyer group of copper claims in Mason valley have been bonded to J. A. Cruikshank of Cincinnati, O., at \$40,000 for nine months.

Varney, Johnson, Tailleux & Gammon of Virginia City, who bonded the Lizard mine 15 miles east of that place at \$12,000 a few months since, say they have taken out \$5000 already and expect to put a mill on the property in the spring.

NYE COUNTY.

Harris & Lambert have relocated the old Liberty mine, 12 miles north of Tonopah, which is said to contain pillars of ore in the old workings which carry values as high as \$400 per ton. They have bonded the mine to Colorado parties, represented

by a Mr. Ish.—L. A. Green and C. Peters of Tonopah own an extension of the Liberty mine, upon which ledges containing ore carrying values as high as \$119 per ton have been opened up by prospect work.

Very high grade ore is being taken out from various points on the Mizpah Lode of the Tonopah M. Co., at Tonopah, and from the Gold Hill, owned by Oddie, Brougher Bros. & J. W. McCullough. The lease of Carion & Co. on Gold Hill is now producing ore which assays 1980 ounces in silver and 32.50 ounces in gold per ton. No ore is being extracted from this lease of less value than \$400 per ton. A lease on the Valley View ledge is producing ore which assays 1700 ounces in silver and \$1100 in gold per ton. The big producers along the Mizpah ledge are now making efforts to secure room to store the increasing output of their leases, of which the 500 animals now hauling ore to the railroad are able to move only a small part. H. C. Cutting has cleared away ground near his shaft, and built up a rampart of filled ore sacks with which he will store several thousand tons of high-grade ore. It is rumored that an offer of \$50,000 for this lease was refused a few days ago. There are several leases on the Mizpah which it is believed will produce more than this amount between now and January 1st, 1902. The return from second-class Tonopah ore worked at the Taylor mill at Gold Hill was \$103 per ton, gold value.

WASHOE COUNTY.

In the Reno Star mine, near Reno, another vein has been cut which is believed to be richer than the first. It is said to be 25 feet wide and heavily mineralized.

NEW MEXICO.

COLFAX COUNTY.

The Granite Gap Copper Co. has been organized by Los Angeles, Cal., people, capital \$1,000,000, with J. DeBarth Shorb president, J. E. Hannon secretary and treasurer, and W. E. Robinson general manager, to operate nine copper claims near Stein's Pass. The ore recently developed is said to be rich.

The Thelma mine, near Elizabethtown, has been bonded to a company of which a Mr. Baker is manager. New buildings have been erected on the mine and the work underground is employing twenty-five or thirty men. A new mill has been bought for the mine. The ore is a concentrating proposition. The vein is about 36 inches wide and runs between two well-defined walls.

SANTA FE COUNTY.

J. Blonger has completed 200 feet of contract work on the Annie Jones mine for A. R. Gibson and W. S. Douglas in the Macho district, near Santa Fe. The values thus far are principally in copper, with some gold.

OREGON.

BAKER COUNTY.

An 80-ton cyanide plant is to be installed at the Flagstaff mine, 7 miles northeast of Baker City. It is claimed that cyaniding will save 95% or better of the values from the ore. The ten stamps are now crushing ore from the upper levels and an additional ten stamps are to be put in. J. E. Meikle of Baker City is consulting engineer for the owners.

The New York, a mining prospect in the Greenhorns, has been sold by W. C. Cowgill and C. C. Nopple to L. Y. Keady of Portland, representing Eastern men. The new owners will develop the property.

The Imperial mine, in the Cable Cove district, near Baker City, is reported to have been bonded by D. Eccles and J. Bourne at \$50,000—\$5000 cash paid. The Imperial was owned by Colbath, Crisman & Young and the late R. C. Chambers of San Francisco, and has produced some fine shipping ore. On the Imperial ledge is found a vein carrying galena, which continues as far as the long working tunnel has been driven.

CURRY COUNTY.

A 5-stamp mill is being built for the Mule mine located on Rogue river, 45 miles from its mouth. The ledge in the Mule mine is from 6 to 24 feet in thickness, and at a depth of 300 feet it is claimed assays \$33 to the ton.

GRANT COUNTY.

The Olive creek placer mines, 8 miles from Alamo, owned by J. Hinton, E. Houser and other Sumpter people, have been sold to W. C. Calder, D. Copping and D. L. Killen. It is the intention of the new owners to equip the mines for operation next spring.

While driving a crosscut tunnel to cut the main ledge in the South Cougar mine at Granite a large blind ledge has been cut that gives high values. The tunnel is now in 450 feet and will be continued for the main ledge, which it is expected will be reached within the next 100 feet. The

vice-president of the company, E. E. Stewart of St. Louis, Mo., is at the mine. JACKSON COUNTY.

The 10-stamp mill of the Ashland mine at Ashland, operated by the Montreal & Oregon G. M. Co. (Limited), is crushing from twenty-five to thirty tons of ore daily with satisfactory returns. Drifting is now being done on both ways from the shaft on the 800-foot level.

JOSEPHINE COUNTY.

J. W. Opp, who is operating the Golden Standard mine, in Jackson creek district, under bond, has five men getting out ore. The mill is being operated by McDonald & Meier. A test of 500 tons of ore is being made.

The Stalker hydraulic mines, situated at Althouse, have been sold by J. K. Stalker to A. Clemens of Philadelphia for \$4000, cash down.

The Spence-Cass copper mines, near Waldo, have been bonded by R. B. Whiteside of Duluth, Minn., at \$100,000, on long time, allowing for the complete development of the property. These mines consist of two groups of claims and are situated on Houck mountain. The veins are wide and carry values in copper and some gold. Mr. Whiteside is running two tunnels to crosscut the ledges.

MALHEUR COUNTY.

E. P. Cowan says of the Big Bend mining section at Ontario that, in his opinion, it greatly resembles the Witwatersrand banket district of the Transvaal, South Africa. The Singer shaft, he says, was sunk 87 feet. At 44 feet it encountered a conglomerate deposit carrying free-milling gold values ranging from \$6 to \$13 per ton. Fifteen feet deeper the deposit was the same and the values identical.

UNION COUNTY.

W. Muir, the owner of the Golden Star mine in Camp Carson district, west of La Grande, will work a force of men until spring. The Golden Star, he says, has 700 feet of tunnels and 1500 tons of ore on the dump. The Royal and the Standard are two other developed mines of this district and a number of prospects are being opened up.

UTAH.

BEAVER COUNTY.

For 150 tons of ore from the O. K. group of mines near Frisco, the Majestic M. Co. has received nearly \$13,000. The gross value of the ore showed an average of \$102 per ton. The proposition requires a furnace that will enable it to smelt the ore upon the ground.

The Powers M. & M. Co. has been incorporated, capital \$30,000. The officers are M. L. Powers president and A. Barnett secretary and treasurer. The company owns mining claims in Granite district.

BOX ELDER COUNTY.

The Monument G. M. Co. has been incorporated, capital, \$150,000. The company owns $\frac{2}{3}$ of the Monument claim, together with the Lupus Romulus and Remus claims in an unorganized district in this county. The officers are J. Rosevear president and G. Anderson secretary, with office in Salt Lake City.

A. C. Lochwitz, manager of the Sunrise M. Co., at Park valley, has been discussing with the directors of the company the advisability of putting in a new mill at the mine. Ore is being taken out which assays over \$20 a ton.

PIUTE COUNTY.

The Mt. Baldy G. M. & M. Co. has been incorporated, capital \$300,000. P. A. H. Franklin of Salt Lake City is the president and B. D. Luce secretary and treasurer. The corporation takes over the Henry group of twelve claims.

The Banner G. M. Co. has been incorporated, capital, \$125,000. L. H. Bartholomew is president and secretary. The company owns a large group of claims in Gold Mountain district, together with a bond on another adjoining group.

SALT LAKE COUNTY.

The Bingham Con. Co. has decided to build a large concentrator at mouth of Dalton & Lark long tunnel in Copper gulch, near Bingham, to reduce the second-class lead and copper ore to save the difference in cost of transportation to smelter that can be effected. A preliminary plant is to be installed as soon as it can be constructed, and work on the large mill will follow when by experimental work the most suitable processes shall have been decided upon.

SUMMIT COUNTY.

J. Hickey, manager of the Comstock M. Co., at Park City, says that before spring he expects to be ready for a mill of 500 tons daily capacity that he expects the company to provide him with.

The Daly-Judge M. Co., incorporated in New Jersey to mine at Park City, has appointed J. J. Daly of Salt Lake City as agent and attorney in Utah. The in-

corporators are H. O. Hanke, Cincinnati, Ohio; L. H. Wood, Mount Kisco, N. Y.; A. Fowler, Salt Lake City; W. B. Goodwin, New York City, and G. W. Rurde, Jersey City, N. J. The capital is \$150,000.

At the Wabash, at Park City, Foreman W. Campbell has received a large consignment of new boilers, air compressors and other machinery, which he is installing. The shaft is now down 175 feet.

TOOELE COUNTY.

The Honerine M. & M. Co. has been incorporated to mine the group of claims of that name at Stockton. The capital is \$2,500,000. P. S. Kimberly of Sharon, Pa., is president, W. G. Filer of Salt Lake City is secretary, and C. H. Scheu is manager. The property of the company embraces the Honerine, Quandary No. 2, Great Basin, Emerald, Homestead, Gov. Murray, Boston No. 2, First National, West Extension, St. Patrick, Contention, Victoria, Buckeye, Hercules No. 2, Sunflower, Gulch, Fraction, Wedge, Little Anna, Miriam, Texas, Marjorie and the Great Basin mill site. To handle the mines more economically the company is now preparing to sink a triple-compartment shaft, equipping it with a steam hoist plant and air compressor. The shaft is to be sunk 450 feet before any crosscutting is done and the raising of ore commences.

The Cyclone & Leap Year M. Co. has been incorporated at Salt Lake City with \$4000 capital, and H. H. Green president and O. W. Humrow secretary and treasurer. The property of the company consists of the Cyclone and Leap Year lodes in the Clifton district.

WEBER COUNTY.

The Glendore M. Co. has been incorporated in Salt Lake City, capital \$25,000. J. Lippman is president and J. James secretary and treasurer. The property of the company consists of sixty acres of ground in Erickson mining district, 40 miles distant from Fairfield. A shaft on the property is all in ore running well up in lead and 13 ounces silver and 40 cents gold per ton. It is the intention of the company to sink 100 feet.

WASHINGTON.

KITTITAS COUNTY.

The Sure Thing Gold-Copper M. & S. Co. has been incorporated, capital \$125,000, with G. W. Daines, A. R. Watson, J. Watson, J. R. Shearing and T. Collier, all of Kittitas county, as trustees. The office of the company will be in Spokane.

The Mother Lode mine, owned by the Mountain Gulch M. Co. of Farmington and Garfield, is claimed to be showing rich ore in all the workings. Two tunnels and a shaft have been run on the property. In the shaft, down 94 feet, an average assay of \$71 in gold has been obtained.

SPOKANE COUNTY.

The John Day M. Co. has been incorporated, capital \$65,000, with J. L. Wilson, C. S. Voorhees and R. H. Voorhees as trustees.

WHITMAN COUNTY.

The Blue Bird mine in the Hoodoo district, near Palouse, is to be reopened after having been closed down several months. A concentrator may be erected on the property. The stockholders have elected H. W. Greenberg of Spokane president, A. B. Harris of New Hampton, Iowa, secretary, and D. D. McDonald manager.

FOREIGN.

BRITISH COLUMBIA.

The Prospectors' Exchange of Nelson says: The development work on the Old Ironsides, Victoria and Grey mines, Greenwood, consists of 2256 lineal feet of sinking and raising, and 10,000 feet of crosscutting and drifting. The deepest shaft is down 400 feet and a diamond drill has proven that the ore reaches a depth of 800 feet. A quarry has been opened up in ore which is known to extend about 3000 feet on the company's ground, and to have a width of from 300 to 400 feet. The Black Warrior group in the Lardeau district has been bonded by D. A. Stewart and N. B. Weber of Winona, Minn., at \$60,000. C. N. Coursier, the vendor, retains an interest in the property. The Golden Crown mine in Wellington camp has resumed with a few men. The property is one of the first shippers in that camp and has sent out to date 2500 tons of first grade ore. P. V. Loth of Cincinnati, Ohio, has taken a bond on the Union Jack on Porcupine creek and the Wilcox mine on Wild Horse creek, Ymir district. He will work the properties during the winter. It is reported that the Canadian Pacific R. R. Co. has bonded a group of eighteen iron claims on Iron mountain, about 10 miles north of Wardner, B. C., at \$100,000, \$10,000 down and the balance in payments extending over a year. The second payment of \$2000 on the Bayonne group bond held by A. L. Davenport of Spokane has been made. These free gold claims were

located about three months ago. The C. P. R. are building a spur from Gladstone to the Cascade and Bonanza mines in the Boundary district. A contract has been made with the Granby smelter to deliver 500 tons. It is thought that the property will ship ten tons of ore daily throughout the winter.

Nelson, Nov. 25.

A rich strike has been made near Nelson by a company headed by J. P. Byrnes of San Mateo, Cal., which recently bought the Church group of claims. It is said the ore taken from the mine averages \$60 a ton, and a 9-foot vein has been opened up. From a pocket a piece of gold has been taken which is said to have netted \$1800. Plans for erecting a 20-stamp mill are under way. J. Champlin is Supt.

The third annual meeting of the Center Star M. Co. was held at Toronto on the 26th ult. The financial statement showed that during the year the company's indebtedness had been reduced from \$182,122 to \$42,120, besides paying \$175,000 in dividends. The old board of directors were re-elected. The report of the manager showed that during the year the ore sales were 80,419 tons, averaging \$14 64, smelter's gross assay value. The present ore reserves are estimated at about 44,000 tons, with smelter's average gross assay value of \$15 per ton.

Personal.

N. C. RAY has returned from Harrison Gulch to Coulterville, Cal.

C. SKOEFIELD is now manager the Newbury Mining Co., Pinal county, Arizona.

C. J. FREDERICKS is manager Columbia G. M. Co.'s operations at York, Montana.

HENRY A. BUTTERS of Salt Lake City, Utah, is looking after his mining interests at Steamboat, Nev.

E. P. PORTER of the U. S. Geological Survey is in Reno, Nev., securing mining data for government use.

W. H. PAUL of Leadville, Colo., has been appointed manager of the Mammoth G. M. Co. at Central City, Colo.

H. F. BROWN of San Francisco, Cal., is at Sims, Shasta Co., Cal., engaged in an examination of an asbestos deposit.

FREDERICK HOAR succeeds S. A. Parnall in the management of the Old Dominion copper mine, Globe, Arizona.

SUPT. BUZZO of the Alice mine, Walkerville, Mont., is asked to furnish 10,000 tons of zinc ore on an Eastern order.

S. E. ROBBINS, metallurgist at the Balakala copper mine, near Redding, Cal., has returned to the mine from Salt Lake City, Utah.

WM. PEARCE has been appointed assistant foreman of all the Gold Hill, Nev., Comstock mines, from the Con. Imperial to the Caledonia.

W. A. PRICHARD has resigned as Supt. Keystone Con. M. Co., at Amador City. He has accepted a similar position at Coolgardie, West Australia.

R. H. POSTLETHWAITE has returned to San Francisco, Cal., from a reconnaissance through New Mexico, where he will place some gold dredgers.

T. E. SCHWARZ, who for the past three years has been manager Iron Silver M. Co., Leadville, Colo., has resigned and removed to Denver, Colo.

J. B. EARLY and ROBERT MILLS are respectively president and secretary of the American Mining Association of the Philippine Islands at Manila.

ROBERT ANGUS, formerly Supt. Iron Mountain mine, Missoula, Mont., says he is now Supt. Le Roi mine, Rossland, B. C., at a salary of \$12,000 per year.

A. CARPENTER, M. E., has returned to his home in Oakland, Cal., from Sumatra, where he is engaged in hydraulic mining. He expects to return there in January.

E. L. SHAFNER of Cleveland, O., president International Mining Congress, is in Butte, Mont., in connection with the proposed 1902 session of the Congress in that city.

J. STARK has been appointed Supt. Logan and Eagles mines at Cripple Creek, Colo., succeeding P. Eisenhart, who has become Supt. Lincoln mines at the same place.

BEN STANLEY REVETT of Breckenridge, Colo., contemplates a trip to Ivory, on the west coast of Africa, being consulting engineer for a French mining company operating there.

D. C. JACKLING, late Supt. Republic mill at Republic, Wash., has been appointed consulting engineer to the United States Reduction & Refining Co., which is operating mills at Florence and Colorado Springs, Colo.

BERNARD MACDONALD, late manager B. A. Corporation, Rossland, B. C., is credited with intention to assume a simi-

lar position with the Anglo-Canadian Lead Syndicate, Lake Temiscamingue, Quebec, Canada.

W. S. MCCORMICK, J. E. BAMBERGER AND E. F. HOLMES of Salt Lake City, Utah, are in New York, representing the lead mining interests of Utah in the conference now on between the miners and smelting interests.

Commercial Paragraphs.

THE Atlas Pipe Wrench Co. report that a well known jobbing house in the Middle States has placed four orders for quantities of Atlas pipe wrenches in the last forty days—a new stock order every ten days.

THE Pacific coast office of the Allis-Chalmers Co. is at 137 Montgomery St., San Francisco, Cal.; Mr. George E. Ames is the Pacific coast representative of the company, and is in charge of their San Francisco office.

THE Globe Iron Works, Stockton, Cal., are supplying their Globe battery stem guides to the Golden Chest M. Co., Murray, Idaho, and the Liberty Bell Gold M. Co., Telluride, Colo. They also report considerable demand for the Truax ore cars, the manufacture and sale of which they control on the Pacific coast.

THE aerial wire rope tramway of the New Year G. M. Co., at New Year, near Lewiston, Montana, is finished. Its exact length is 5150 feet and it has a guaranteed capacity of twenty-five tons an hour. It is a Bleichert wire rope tramway, and cost \$17,500. This is the first wire rope tramway ever erected in that county, and was furnished by the Trenton Iron Co. of Trenton, N. J.

AT the Fulton Engine Works, Los Angeles, Cal., has been completed a framework for a telescope ordered by the Lick Observatory at Mt. Hamilton, Cal. The work is up to specifications and has been passed upon by observatory officials. The steel in the framework weighs 8000 pounds; the tube for the lenses is 40 inches diameter and 16 feet long. The main pivotal bearings are two 14-inch steel rollers on phosphor-bronze bearings. The lenses are made in the East at a cost of about \$10,000. The instrument goes to Mt. Hamilton for testing purposes only, and goes thence to Chile.

THE Crocker-Wheeler Co. of Ampere, N. J., reports being pushed to its utmost to keep up with the large number of orders it is daily receiving and has on hand. They are constantly adding to the number of factory hands, and have for some months been working a regular night shift. Among shipments made during the last month are two 520 K.W. generators for the American Smelting & Refining Co., Perth Amboy, N. J.; three 400 K.W. and one 100 K.W. for the Alsen Cement Plant, West Camp, N. Y.; one 400 K.W. generator for the Christenson Engineering Co., Milwaukee, Wis.; one 300 K.W. generator for the Balbach Smelting & Refining Co., Newark, N. J.; three 200 K.W. generators for the Stetson & Co.'s New Power Plant, Philadelphia; one 375 K.W. generator for the Anglo-American Provision Co., Chicago, Ill.; one 400 K.W. and one 75 K.W. for the Lake Shore & Michigan Southern Railroad; one 200 K.W. generator for the Vandergrift Construction Co., for railroad work; one 200 K.W. generator for the Crucible Steel Co., Blair, Pa.; one 150 K.W. generator for the Latrobe Steel Co.; one 200 K.W. generator for the Otis Elevator Co., and one 100 K.W. generator for the United States Tube Co. They have also completed the entire shipment of the 45 K.W. direct-connected generator and fifty or sixty motors for the Government Printing Office in Manila, Philippine Islands. Among the orders recently received are noted the following: Two 300 K.W. generators for the Singer Mfg. Co., South Bend, Ind.; two 200 K.W. belted generators for Sayre & Fisher, Sayreville, N. J.; one 60 K.W. and one 30 K.W. generator for the Orange Brewing Co., with various motors ranging from 35 H. P. to 2 H. P. in capacity; four 140 K.W. generators for the Fort Hill Chemical Co., Rumford Falls, Me.; two 75 K.W. generators for Henry Lang & Co., Newark, N. J.; one 90 K.W. generator for the United States Electric Lighting Co., Washington, D. C. Shipment of thirteen motor-dynamos for the Western Union Co.'s plant, Milwaukee, Wis., and the electrical equipment of Skinner & Sethman Publishing Co.'s plant, Denver, Colo., consisting of 40 K.W. generator and twenty-eight motors, will also be made this month.

Obituary.

GOTTHA HAIST, an old and well-known Nevada mining engineer, died on the 3rd inst. at Virginia City, Nev., in the 78th year of his age. Deceased was a native of Stuttgart, Germany.

Latest Market Reports.

SAN FRANCISCO, Dec. 5, 1901.
SILVER.—Per oz., Troy: London, 25½d (standard ounce, 925 fine); New York, bar silver, 54½c (1000 fine); San Francisco, 54½c; Mexican dollars, 47c San Francisco, 43c New York.
COPPER.—New York: Lake, 1 to 3 casks, \$17.25; carload lots, \$16.85; Electrolytic, 1 to 3 casks, \$16.75; carload lots, \$16.62½; Casting, 1 to 3 casks, \$16.60; carload lots, \$16.50. San Francisco: 18. Mill copper plates, 20c; bars, 22@23c. London: £55 5s per ton.
The market can be described as demoralized. While prices are nominally held up in New York, statements of sales made below the open figures are persistent; the market price for standard in London is quoted at 12 cents a pound. With this difference it would seem impossible to keep the open prices up in this country.
LEAD.—New York, \$4.37½; Salt Lake City, \$4.00; St. Louis, \$4.40; San Francisco \$4.90, carload lots; 5½c 1000 to 4000 lbs.; pipe 8, sheet 6½, bar 5½c; pig, \$5.25. London, £11 per ton—2.41 cents per lb.
SPELTER.—New York, \$4.20; St. Louis, \$3.75; London, £16 2s 6d per ton —3.58½ cts. per lb.; San Francisco, ton lots, 5½c; 100-lb lots, 6c.
ANTIMONY.—New York, Cookson's, 10c; Hallett's, 9c; San Francisco, 1000-lb. lots, 10c; 300 to 500 lbs., 11c; 100-lb. lots, 13@15c.
IRON.—Pittsburg, Bessemer pig, \$16.50; gray forge, \$14.00; San Francisco, bar, 2.60c per lb., 2.65c in small quantities.
STEEL.—Bessemer billets, Pittsburg, \$24; open hearth billets, \$26.50; San Francisco, bar, 7c to 12c per lb.
NICKEL.—New York, 50@60c per lb.
TIN.—New York, pig, \$27.50; San Francisco, ton lots, 27c; 1000 lbs., 27½c; 500 lbs., 27½c; 200 lbs., 27½c; less, 28c; bar tin, 28½c, 32½c.
PLATINUM.—San Francisco, crude, \$19 per oz.; New York, \$20.50 per Troy oz.
BISMUTH.—New York, 2½c, 2.2c 50-lb lots; San Francisco, 2.50 to 2.75 per lb. lots.
QUICKSILVER.—New York, \$51.00 large lots; London, £9 2s 6d; San Francisco, local, \$48.00 per flask of 76½ lbs.; Export, \$45.00.
MAGNESIUM.—New York, \$2.90 per lb.; San Francisco, \$3.75.
ZINC.—San Francisco, 5½c; slab, 5½c; bar, 7c; zinc dust, N. Y., 8c.

BABBITT METAL.—San Francisco, No. 1, 10c.
ALUMINUM.—New York, No. 1, 99c pure ingots, 35c; No. 2, 90c, 30c to 35c.
SOLDER.—Half-and-half, 100-lb. lots, 18c; San Francisco, Plumbers', 100-lb. lots, 15.25c.
PHOSPHORUS.—F. O. b. New York 50@60c per lb.
FERRO-TUNGSTEN.—New York, 37%, 32c; San Francisco, 65c (60%).
POWDER.—F. O. b. San Francisco: No. 1, 70% nitro-glycerine, per lb., in carload lots, 15½c; less than one ton, 17½c. No. 1*, 60%, carload lots, 13½c; less than one ton, 15½c. No. 1** 50%, carload lots, 11½c; less than one ton, 13½c. No. 2, 40%, carload lots, 10c; less than one ton, 12c. No. 2*, 35%, carload lots, 9½c; less than one ton, 11½c. No. 2** 30% carload lots, 9c; less than one ton, 11c. Black blasting powder in carload lots, minimum car 728 kegs, \$1.50 per keg; less car lots, \$2 per keg.
CAPS.—3x, \$5.50 per 1000; 4x, \$6.50; 5x, \$8; Lion, \$9, in lots not less than 1000.
FUSE.—Triple tape, \$3.60 per 1000 feet; double tape, \$3.00; single tape, \$2.65; Hemp, \$2.10; Cement No. 2, \$3.00; Cement No. 1, \$2.65, in lots of 3000 feet and up.
CANDLES.—Granite 6s, 16 oz., 40s., 10c per set; 14 oz., 40s., 9c.
CHEMICALS.—Cyanide of potassium, 98%-99%, jobbing, 30@31c per lb.; carloads, 28@29c; in 10-lb. tins, 40c; sulphuric acid, in carboys, 66% B, 2c per lb.; soda ash, \$1.90 per 100 lbs.; hyposulphite of soda, 2½@3c per lb.; blue vitriol, 5½@6½c per lb.; borax, concentrated, 7@8c per lb.; chlorate of potash, 12@13c; roll sulphur, 6c; alum, \$1.90@2.00; flour sulphur, French, 2½@2½c; California refined, 1½@2c; nitric acid, in carboys, 8c per lb.; caustic soda, in drums, 3@4c per lb.; Cal. s. soda, bbls., \$1.00; sks, 95c per 100 lbs.; chloride of lime, spot, \$2.50@2.60; nitrate of potash, in kegs, 8c; caustic potash, 10c in 40-lb. tins.
OILS.—Linsed, pure, boiled, bbl., 74c; cs., 79c; raw, bbl., 74c; cs., 78c. Deodorized Stove Gasoline, bulk, 14½c; do., cs., 20½c; 86° Gasoline, bulk, 20c; do., cs., 26c; 63° Naphtha or Benzine, deodorized, in bulk, per gal., 13½c; do., in cs., 19½c; Lard Oil, Extra Winter Strained, bbl., 75c; cs., 80c; No. 1 bbl., 50c; cs., 55c. Neatsfoot Oil, cooper's bbls., 60c; cs., 65c; No. 1 bbl., 50@52½c; cs., 55@57½c.
COAL.—San Francisco, coast, yard prices: Wellington, \$9; Seattle, \$7.00; Coos Bay, \$5.50; Southfield, \$9.00. Cargo lots, Eastern and foreign: Wallsend, \$8.00;

Brymbo, \$7.50; Pennsylvania, hd., \$14.00; Scotch, \$8; Cumberland, \$12; Cannel, \$9.50; Welsh Anthracite, \$12.00; Rock Springs, \$8.50; Colorado Anthracite, \$14.50. Coke, \$16 per ton in bulk; \$18 in sacks.
Recently Declared Mining Dividends.
Osceola Con. M. Co., Mich., \$3 per share.....Dec. 23
Bunker Hill & Sullivan M. & C. Co., Idaho, monthly, \$21,000.....Dec. 4
Last Dollar M. Co., Colo., quarterly, 2 cents per share, \$30,000.....Dec. 10

Notices of Recent Patents.
Among the patents recently obtained through Dewey, Strong & Co.'s SCIENTIFIC PRESS U. S. and Foreign Patent Agency, the following are worthy of special mention:
PHOTOGRAPHIC CARD MOUNT.—No. 687,411. Nov. 28, 1901. P. J. Stuparich, San Francisco, Cal. This invention consists in forming the card with a pasteboard or similar paste of considerable thickness and applying to the front a thin veneer of wood which is submitted to the card-board to form a substantially integral part thereof, and the surface thus formed may be afterwards indented or impressed by a die of any suitable or desired form.
TREE SUPPORT.—No. 687,529. Nov. 28, 1901. A. A. Hoyt, Watsonville, Cal. This is a device for supporting the limbs of trees to prevent their being broken by weight of fruit. It consists of a wire hook having two members or jaws adapted to engage the limbs and clamp them, and two of these clamps upon opposite sides of the body may be connected together by a rope or wire so that they are practically self-supporting.
SCHOLARS' COMPANIONS.—No. 687,412. Nov. 28, 1901. Anna W. Trescott, Oakland, Cal. The object of this invention is to provide a convenient holder for pencils, pens, erasers, rulers and like instruments, the holder being of such a nature as to prevent the noise and clatter usually caused by the movement of such articles. It consists of a flexible back having a variety of compartments made in it suitable for the articles, and means for removably attaching it to the desk or other part where it is to be used.
MAIL BOX.—No. 687,528. Nov. 28, 1901. W. G. Hawley, San Jose, Cal. Assigned to Bates Hawley Postal Box Signal Company of San Jose, Cal. This mail box is designed especially for the rural delivery system and consists of a box having a longitudinal side opening near the top, an inwardly and upwardly swinging flap by which the opening is normally closed, with means for preventing the ingress of moisture around the edges of the flap, a perforated corrugated bottom for the box and a sharp or cone-edged partition to prevent pilfering. Signal devices are disposed at

either end of the box to notify the carrier and the recipients of the mail respectively when anything has been deposited in the box for them.
ATTACHMENT FOR AUTOMATIC PIANO OR ORGAN PLAYERS.—No. 687,559. Nov. 28, 1901. A. T. Derby, San Francisco, Cal. This is a self-playing attachment for pianos and organs, and has particular relation to a means for muffling the sounds caused by the scraping of the paper over the tracker-board and the suction of the air through the tubes, as well as the movement of the levers which govern the time, expression, etc. Devices are also provided by which both the loud and soft pedals of the instrument are under convenient control and the tone shading during the performance upon the instrument is very greatly improved.
TRAVELING SPRAYING APPARATUS.—No. 687,390. Nov. 28, 1901. G. A. and R. F. Dunn, Dinuba, Cal. This device is designed for the purpose of spraying trees and plants with mixtures or solutions which are designed to destroy insects and vermin and to otherwise improve the condition of the plants. It comprises a hollow cylindrical roller journaled in a frame and adapted to contain a solution, pumps mounted upon the frame and connections by which the pumps are driven from the revolving roller, suction pipe connections between the pumps and the interior of the roller agitators so constructed as to revolve within the roller out of contact with the suction pipe and a removable corrugated jacket exterior to the drum to give it proper tractive force and prevent its slipping on soft ground. A supplemental receiving cylinder is employed through which the mixture is pumped under pressure, and from which it is delivered through a suitable exterior filter to the spraying pipes.
New Patents.
DEWEY, STRONG & CO.'S SCIENTIFIC PRESS PATENT AGENCY, 330 Market St., S. F., has official reports of the following U. S. patents issued to Pacific coast inventors:
FOR WEEK ENDING NOVEMBER 26, 1901.
687,392.—SHAFT KEY—M. P. Boss, S. F.
687,393.—SHAFT KEY—M. P. Boss, S. F.
687,398.—STEAM BOILER—R. H. Botts, Richmond, Cal.
687,396.—REAMING TOOL—J. S. Brown, Los Angeles, Cal.
687,559.—ORGAN PLAYER—A. T. Derby, S. F.
687,396.—SPRAYING APPARATUS—G. A. and R. F. Dunn, Dinuba, Cal.
687,521.—TRY SQUARE AND BEVEL—D. Elrod, S. F.
687,218.—FARREL CARRIER—Gabriel & Atkinson, Portland, Or.
687,458.—PICTURE EXHIBITOR—G. W. Giles, Garfield, Wash.
687,538.—MAIL BOX—W. G. Hawley, San Jose, Cal.
687,529.—TREE SUPPORT—A. A. Hoyt, Watsonville, Cal.
687,243.—MESSAGE MACHINE—F. King, S. F.
687,378.—HOSE NOZZLE—D. F. Leahy, S. F.
687,475.—HOP DRYING BOX—J. K. Mount, Silverton, Or.
687,408.—TUBE FLARER—Scott & Hightower, S. F.
687,411.—PHOTO MOUNT—P. J. Stuparich, S. F.
687,412.—SCHOLARS' COMPANION—Anna W. Trescott, Oakland, Cal.
687,447.—BUTTON—F. E. Williams, Alhambra, Cal.
35,329.—DESIGN—F. M. Gilham, S. F.

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YOUNG MINING ENGINEER, graduate of one of the best mining schools, desires position. Familiar with Colorado mining and milling practice. Several years' practical experience in assaying, mining and milling. Can assay, survey, keep books, etc. Speak Spanish. Address R., 725 Kittredge Building, Denver, Colo.

WANTED—POSITION AS ASSAYER OR Superintendent of a mine. Have had experience in putting up mills, cyanide plants, smelters and mine machinery and operating them. Have a good assay outfit. Address Jesse L. Wetmore Jr., Piedmont, Alameda Co., Cal.

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POSITION WANTED BY A MAN WHO HAS technical education and twelve years' experience in metal mining; seven years as superintendent. Speaks Spanish. Best of references. Address H., care Mining and Scientific Press.

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Two 38-inch Pelton Wheels on same shaft, especially designed for heavy duty. Each wheel designed to generate 350 H. P. with head of 173 feet. Complete in all details—heavy floor stands, with ring oiling bearings; steel housings; steel floor beams; four throttle valves and electric governor. Plant guaranteed good as new. Ran about four months. Together with 148 feet of 42-inch double riveted steel flume.

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Gold Mine near Jamestown, Tuolumne Co., Cal., developed and ready for a mill; ore milled 320 per ton; price, \$10,000 on bond. Another in Shasta Co., all equipped with hoist and 10-stamp mill ready for operation; price, \$55,000. Also eight patented Mother Lode claims, all connected and well located, for \$75,000. Call or write.

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Absolutely perfect condition. Cost \$1300. Used one month. Price for c. o. b. \$650. Address S. G. LINES, Room 38, 530 California St., San Francisco.

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DELINQUENT SALE NOTICE.

THE YUBA CONSOLIDATED GOLD MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Nevada County, California.

Notice.—There are delinquent upon the following described stock on account of assessment (No. 4) levied on the 12th day of October, 1901, the several amounts set opposite the names of the respective shareholders, as follows:

| Names. | No. Cert. | No. Shares. | Amt. |
|-----------------------|-----------|-------------|---------|
| J. L. Bryson..... | 99 | 1,070 | \$30 00 |
| J. L. Bryson..... | 100 | 1,000 | 31 00 |
| Myles Pickthall..... | 76 | 1,000 | 20 00 |
| Francisco Arata..... | 71 | 1,000 | 30 00 |
| F. Arata..... | 89 | 1,000 | 31 00 |
| Charles Grondona..... | 74 | 1,000 | 20 00 |
| James Grondona..... | 75 | 1,000 | 30 00 |

And in accordance with law, and an order from the Board of Directors, made on the 12th day of October, 1901, so many shares of each parcel of such stock as may be necessary will be sold at public auction at the office of H. W. Morris, room 194, ninth floor, Crocker Building, corner of Post and Market streets, San Francisco, California, on MONDAY, the 10th day of December, 1901, at the hour of 1 o'clock P. M. of said day, to pay said delinquent assessment thereon, together with costs of advertising and expenses of sale.

EDWARD H. STEARNS, Secretary. Office—Room 194, Crocker Building, San Francisco, California.

THE CALIFORNIA DEBRIS COMMISSION, having received applications to mine by the hydraulic process from W. W. Stone, Sr., in the Red Hill Gravel Mine, near Placerville, El Dorado Co., to deposit tailings in a worked-out pit; from Mrs. Olive A. Stone, in the Gignac Gravel Mine, near Placerville, El Dorado Co., to deposit tailings in Webber Creek; and from J. M. Lassiat, in the Lassiat Mine, at Foker Flat, Sierra Co., to deposit tailings in a worked-out pit, given notice that a meeting will be held at Room 59, Flood Building, San Francisco, Cal., on December 23, 1901, at 1:30 P. M.

ASSESSMENT NOTICES.

NATIONAL CONS MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Rich Gulch, Shasta County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 10th day of November, 1901, an assessment (No. 15) of five (5) cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 773 Mission street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 28th day of December, 1901, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on THURSDAY, the 23d day of January, 1902, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors. GEO. W. FLEISSNER, Secretary. Office—773 Mission street, San Francisco, California.

ORLEANS CONSOLIDATED MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Grass Valley, Nevada County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 10th day of November, 1901, an assessment (No. 1) of two (2) cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 324 Pine street, Room 10, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 28th day of December, 1901, will be delinquent and advertised for sale at public auction; and unless payment is made before, will be sold on THURSDAY, the 30th day of January, 1902, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors. GEO. P. THURSTON, Secretary. Office—324 Pine street, Room 10, San Francisco, California.

LARKIN MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, El Dorado County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 7th day of November, 1901, an assessment (No. 11) of two cents per share was levied upon the capital stock of the corporation, payable immediately to the secretary, at the office of the company, 112 Main street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 14th day of December, 1901, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 6th day of January, 1902, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

N. F. REMINGTON, Secretary. Office—112 Main street, San Francisco, California.

INYO MARBLE COMPANY OF CALIFORNIA.—Location of principal place of business, San Francisco, California; location of works, Inyo, Inyo County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 19th day of November, 1901, an assessment (No. 35) of five cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, room 11, tenth floor, Mills Building, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 15th day of January, 1902, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 10th day of February, 1902, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors. CHARLES E. ANDERSON, Secretary. Office—Room 31, tenth floor, Mills Building, San Francisco, California.

MOHICAN MINING & MILLING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Tuolumne County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 6th day of November, 1901, an assessment (No. 2) of five cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, No. 800 California street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 4th day of January, 1902, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 3d day of February, 1902, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors. JNO. W. OLASSEN, Secretary. Office—No. 800 California street, San Francisco, California.

MARINA MARICANO GOLD MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Sunny Hill, Shasta County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 4th day of December, 1901, an assessment (No. 20) of four cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 217 Sacramento street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 6th day of January, 1902, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 27th day of January, 1902, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors. CHAS. BOVONE, Secretary. Office—217 Sacramento street, San Francisco, California.

The Colorado Investment Co., (INCORPORATED.)

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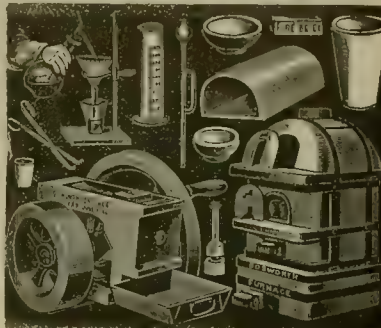
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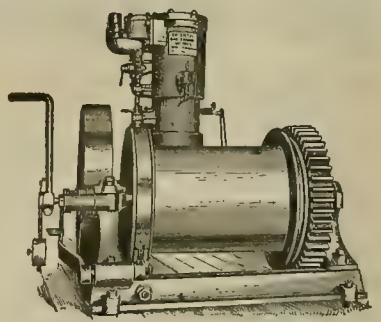
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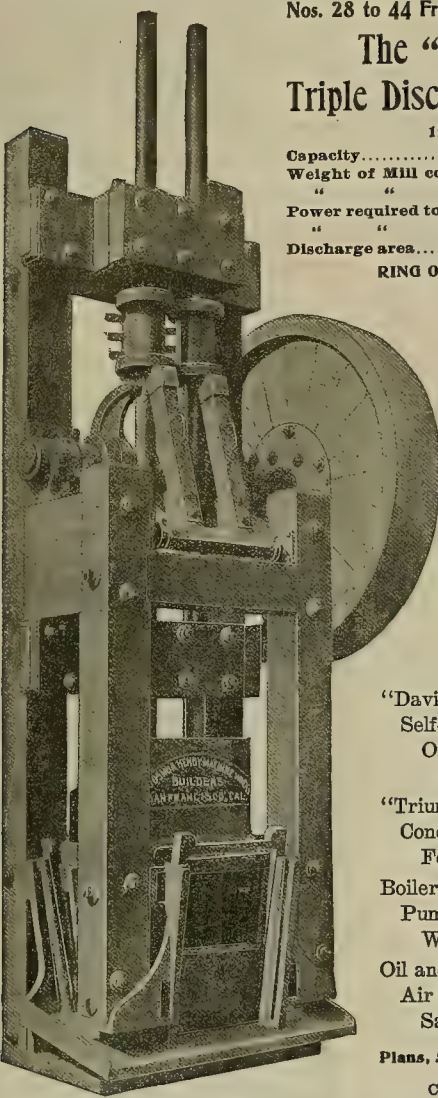
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 Power required to drive 850-lb. stamp mill.....5 H. P.
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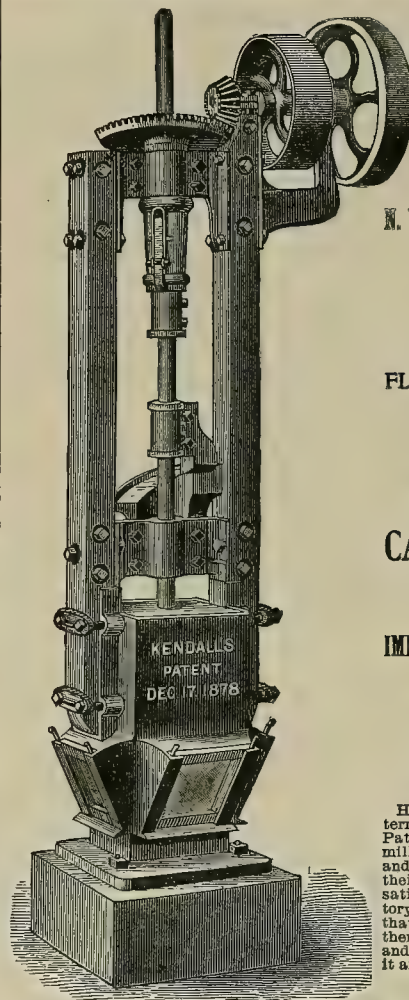
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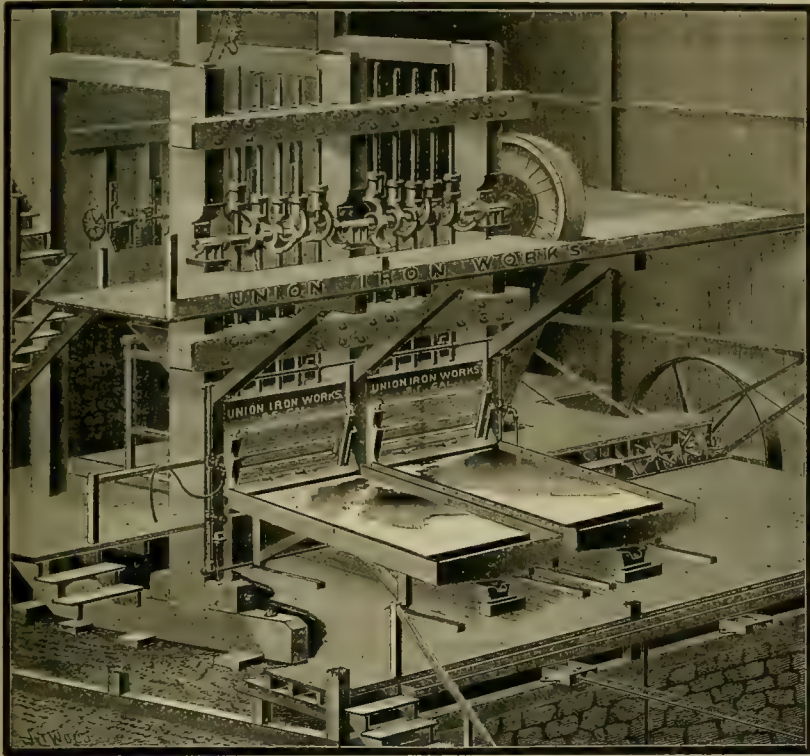
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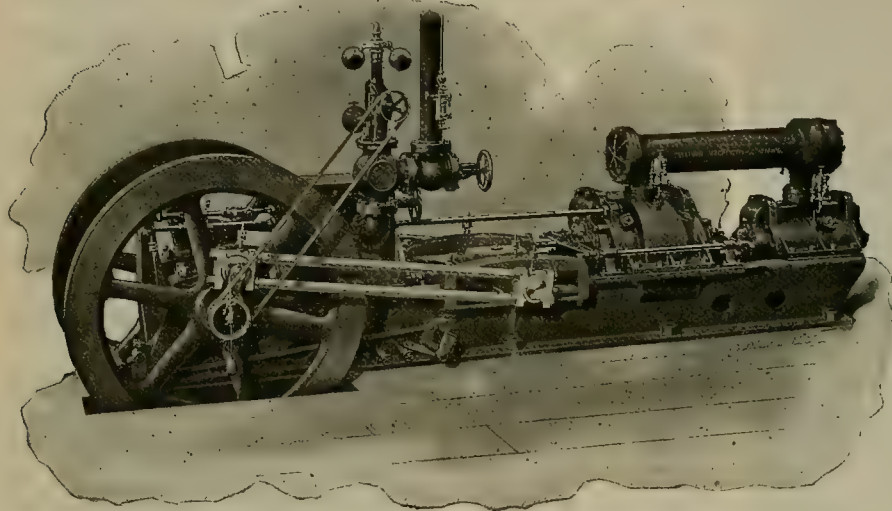
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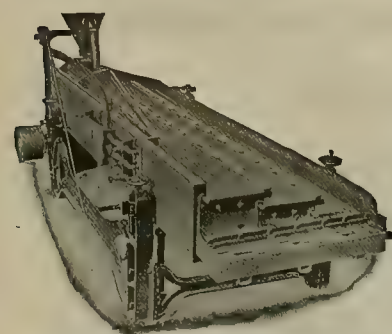
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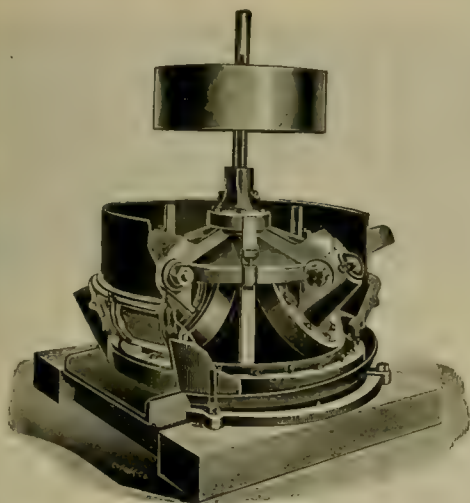
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THREE ROLLER

ORE MILL.

The Griffin Three Roller Ore Mill is a simply constructed Mill, suitable for working all kinds of ores that require uniformly fine crushing by the wet process. This Mill is a modification of the well-known Chilian Mill, but the rollers run upon a crushing ring or die, which is inclined inwardly at an angle of about 30 degrees, the rollers themselves also being inclined to the central shaft of the Mill, thus utilizing the centrifugal force, as well as the weight of the rollers themselves as a crushing agent. The Griffin Three Roller Ore Mill is therefore a Mill of great strength, and has few wearing parts. We construct these Mills with extreme care, using only the best of raw materials, which are most carefully worked by men who are specialists as mill builders. We sell the Griffin Ore Mill on its determined merits, and will gladly supply full information regarding it to any one.

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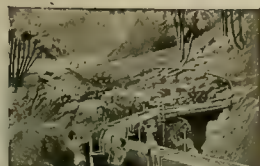
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that will withstand mineral action and climatic influences, besides the wear and tear of mining operations, and rough, mountainous journeys;

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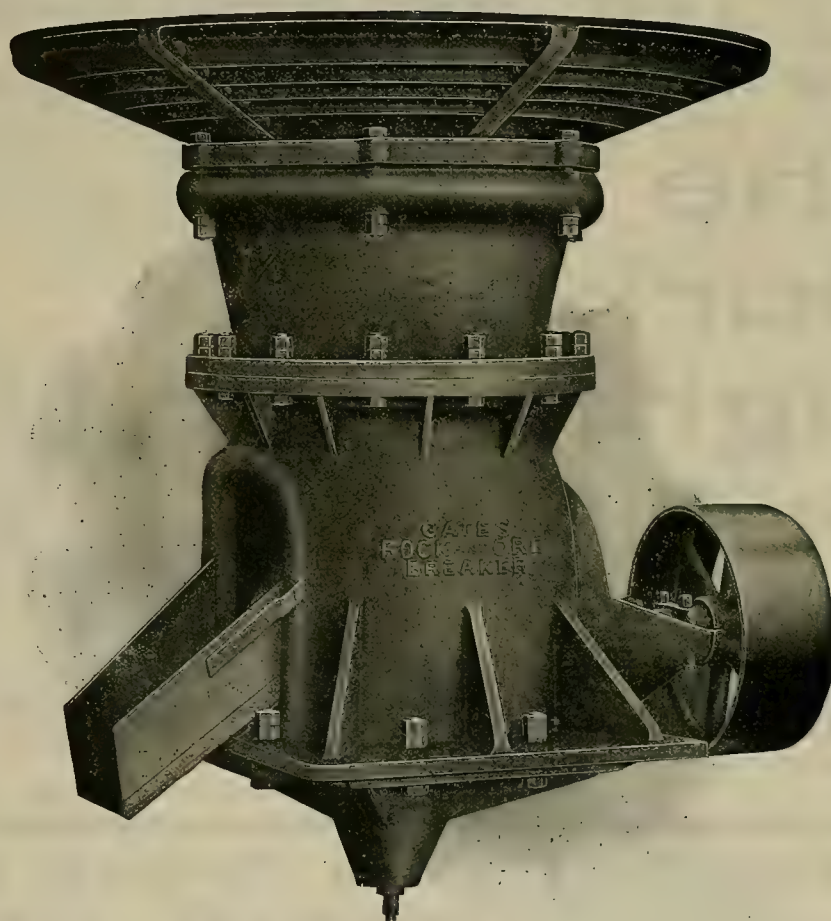
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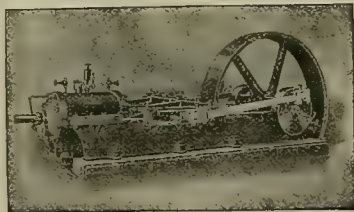
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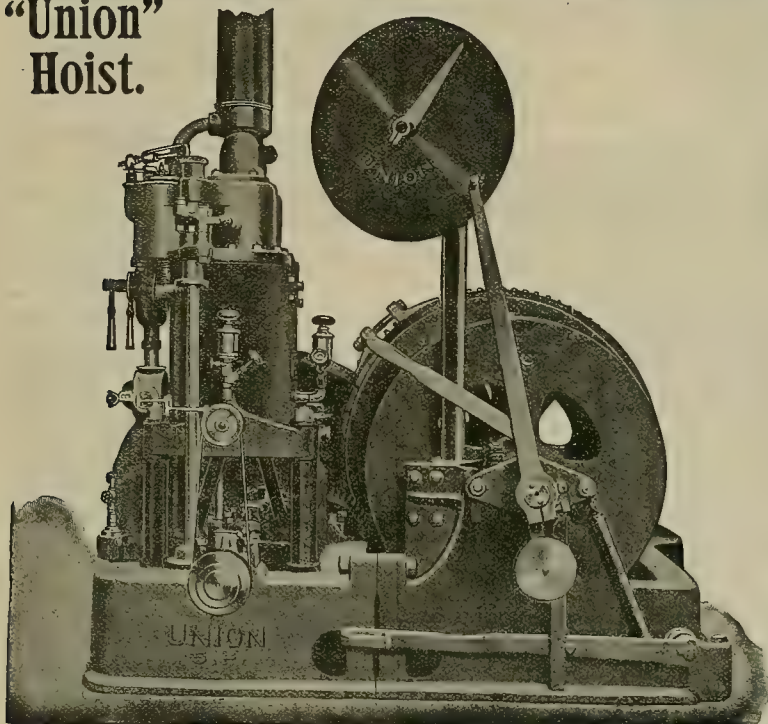
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EXPERT TESTIMONY.

You need not rely wholly upon our word as to the superiority of Jeaneville Pumps.

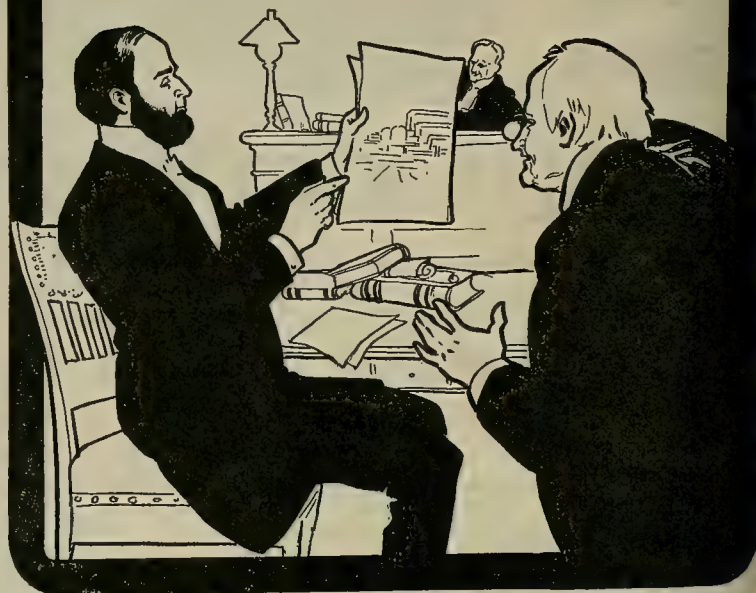
We have letters in proof of our claims from engineers all over the world, the testimony of experts—men who understand mine pumping and practical mining machinery. Some of them are probably well known to you.

We will gladly send copies of their letters if you have any doubt of the merit of Jeaneville Pumps.

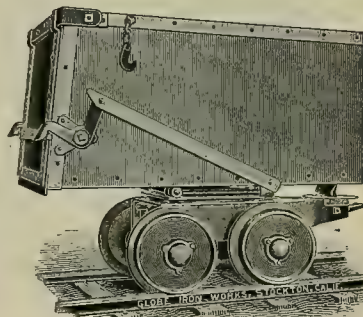
We claim that in Jeaneville Pumps is embodied the most practical combination of simplicity, accessibility, steam economy, capacity and durability. In a word, that they are the best obtainable.

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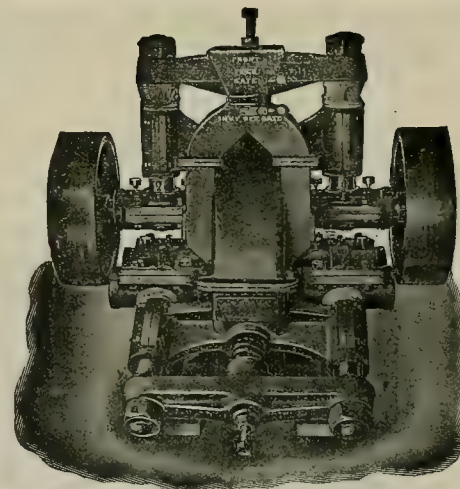
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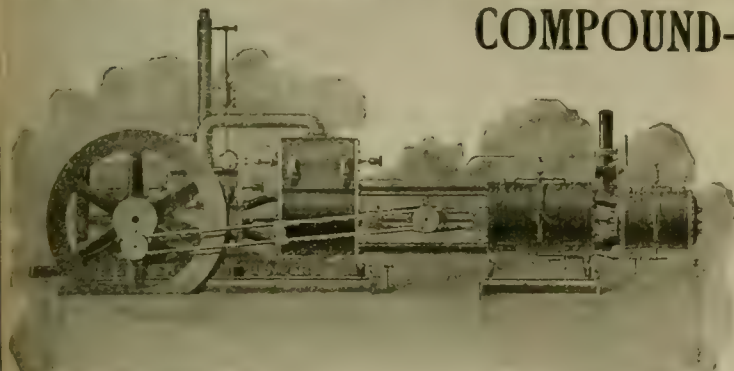
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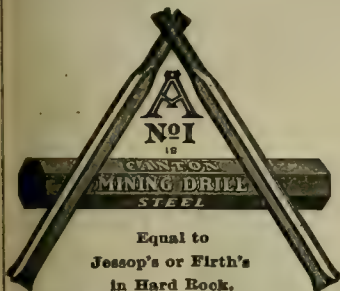
LOW PRESSURE COMPRESSORS
FOR PNEUMATIC CYANIDE
TREATMENT OF ORES.

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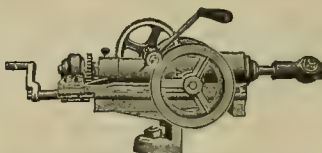
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Made of Steel. Guaranteed against
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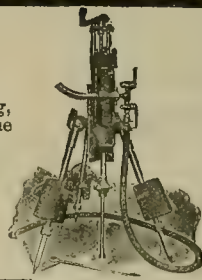
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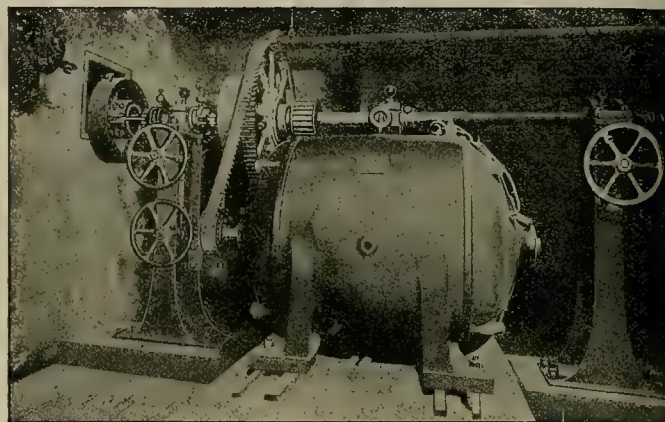
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Renders hard leather soft.
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An excellent preservative.
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Never burns the leather; its efficiency is increased.
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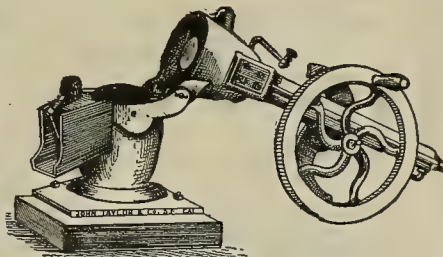
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Price \$100. Write for special illustrated circular.

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Our Specialties: Portable One-Stamp Mill.
Hand and Power Rock Crusher.
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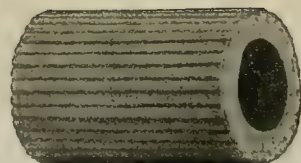
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Plain; Wound with Flat or Round Wire; or Covered with Woven Marline Jacket. Sizes 3-8, 1-2, 3-4 and 1 Inch.

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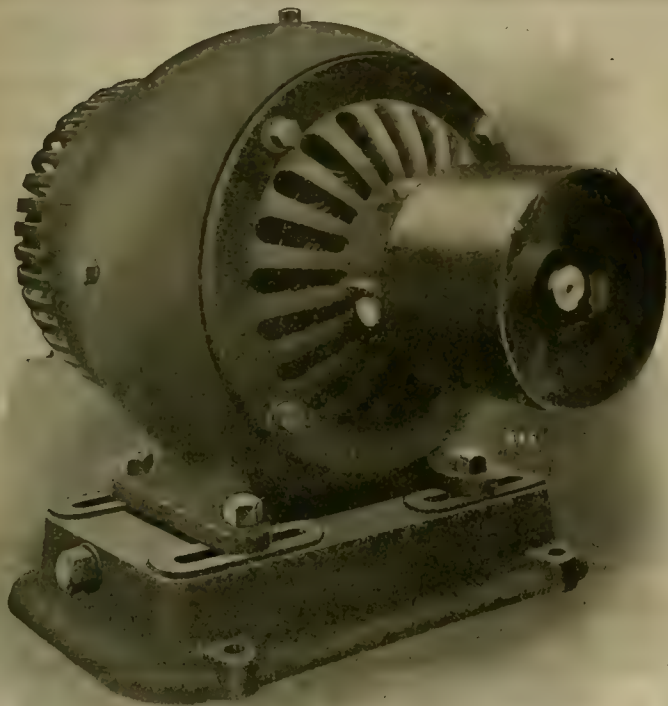
THE rapid and steady growth of our trade on the Pacific Coast induces us to provide for our customers there the same facilities for obtaining our goods as are enjoyed by those further East. We have therefore established a

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Where we shall carry a complete stock of our well-known

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NORTHERN SPHERICAL MULTIPOLAR MOTOR,
INCLOSED TYPE.

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are of such compact and symmetrical design that they are easily operated in any situation, for any kind of work.

They can be belted, geared or direct-connected to the driven machine. They are suited to work in many places where it would be difficult if not impossible to operate other motors. The construction of the bearings is such that the motors can be operated either in a horizontal, VERTICAL or INVERTED position. There is not a better motor made for

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and we solicit correspondence with mining engineers regarding any equipment for either direct or alternating current. We are especially prepared for long distance power transmission work.

ASK FOR BULLETIN 324.

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Carried in Denver.

The Hendrie & Bolthoff M'f'g & Supply Co.

District Sales Managers.

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The shaded part shows that where the most metal mining is done the MINING AND SCIENTIFIC PRESS has the largest part of its circulation. It tells its own story. The MINING AND SCIENTIFIC PRESS is the only mining paper that has a general circulation therein.

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evidence of reliability. An advertiser in this paper is in good company.

In advertising, results are what count. It is not what an advertisement costs, but what it produces, that determines its value. Leading concerns

who continuously buy advertising space herein, say that it is not an experiment, but a profitable investment to advertise in the MINING AND SCIENTIFIC PRESS. Its rates, comparatively, are "cheaper" than those of any other similar publication. "Cheapness" is not regulated by what you pay, but by what you get for what you pay. Advertising in this paper, if properly backed up by what is advertised, insures profitable publicity.

The region shaded on the map has a POPULATION OF TEN MILLIONS ---MINING IS ITS CHIEF INDUSTRY.

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If from any reason anyone thinks "Advertising doesn't pay," we would like to furnish him with evidence that the right kind of advertising does pay. Economy in advertising is like economy in everything else—judicious expenditure of money. The results of an advertisement are what determines its value.



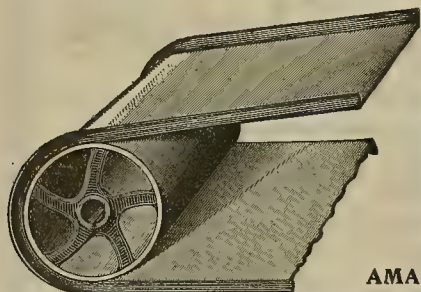
MINING AND SCIENTIFIC PRESS,

330 MARKET STREET,

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SPADONE'S CONCENTRATOR BELTS.

PATENTED.



This illustration shows the edge fanging out-wardly as it passes over the pulley. This relieves the strain from the top and bottom of the edge by directing the strain automatically to the inside face surface of the edges. Heretofore all belts have been so constructed that when they pass over the pulleys or rolls, a direct strain comes upon the top or at the base of the edges, causing the edges to break away from the body of the belts in a very short time. We avoid this Mechanical Defect by our Spadone Curved Edge. Belts made to fit any machine—4, 5 and 6 feet wide. Prices and samples on application.

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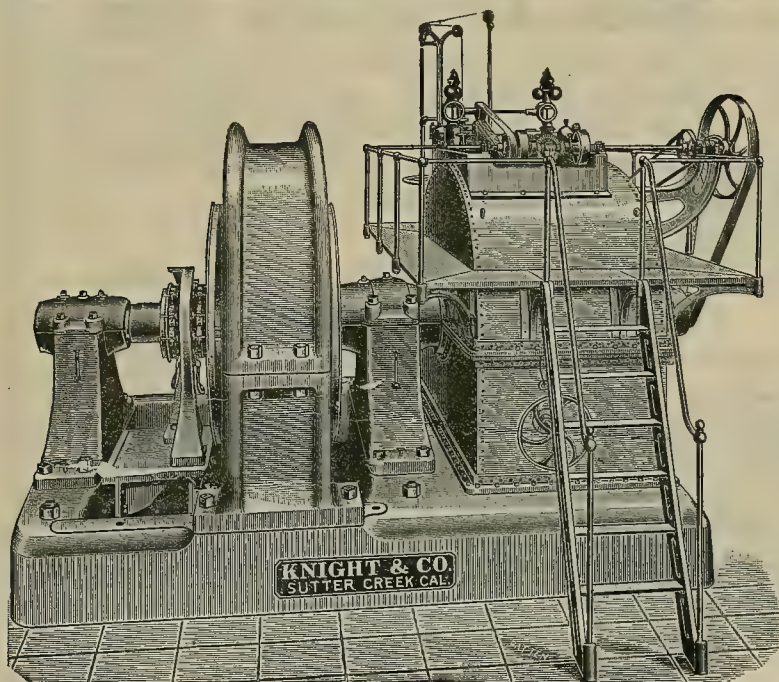
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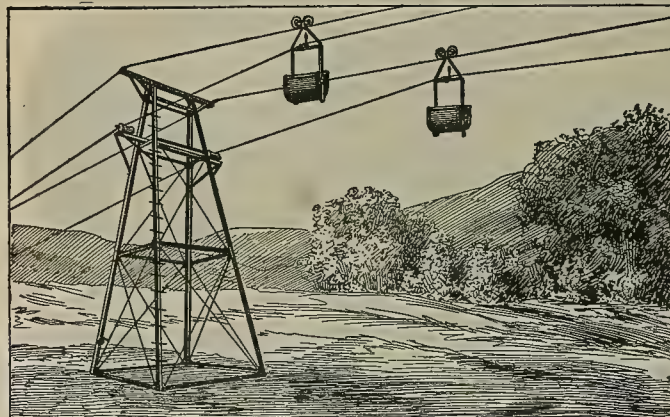
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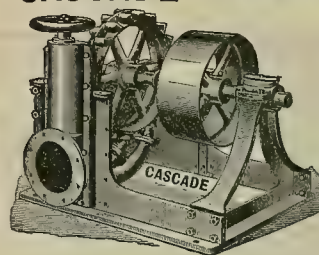
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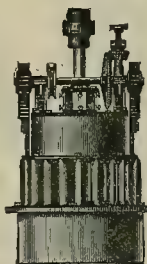
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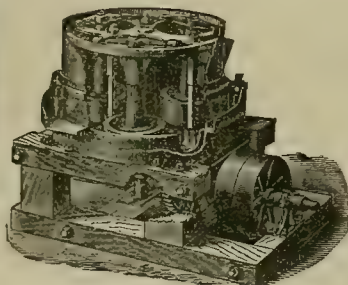
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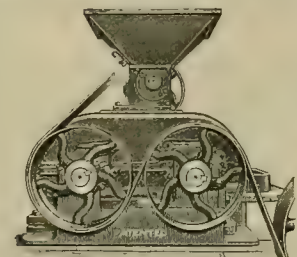
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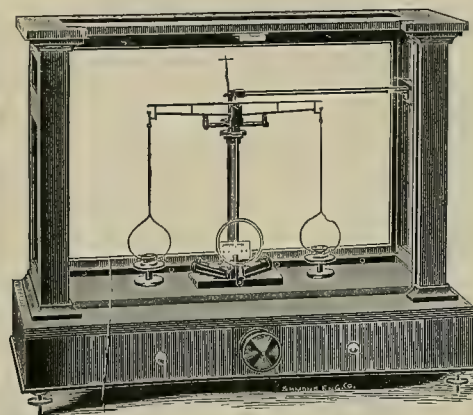
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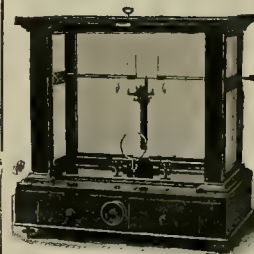
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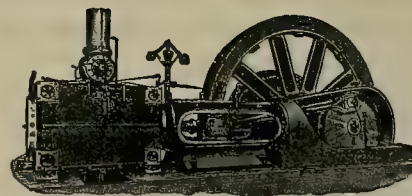
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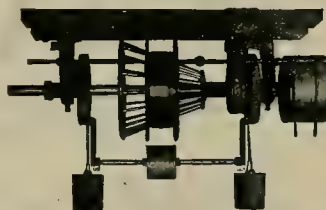
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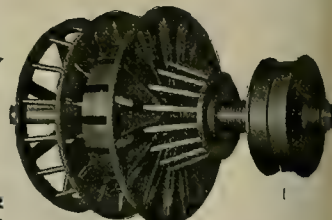
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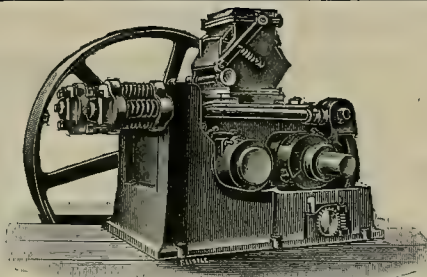
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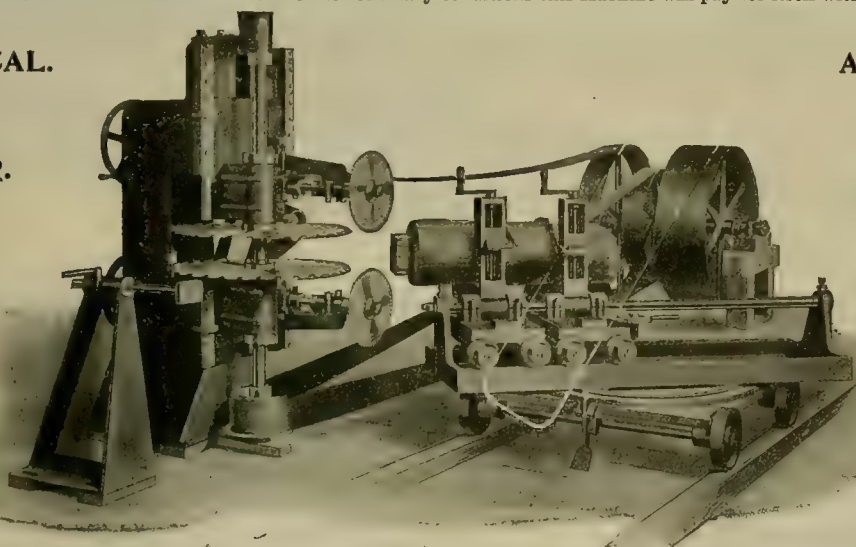
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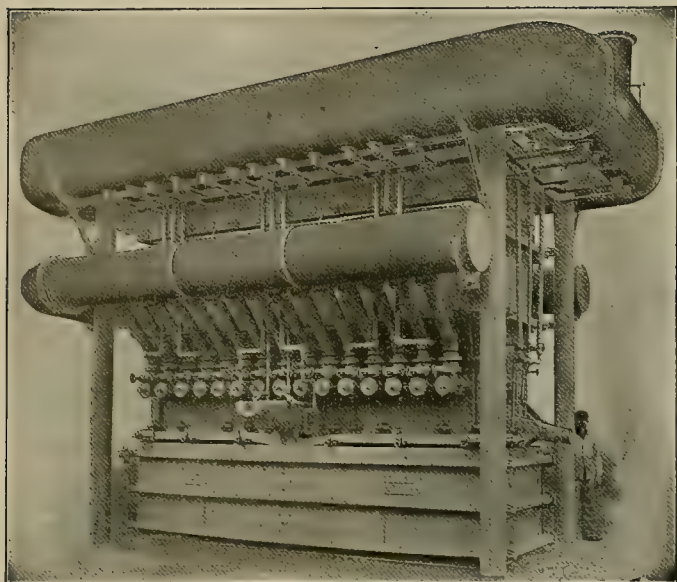
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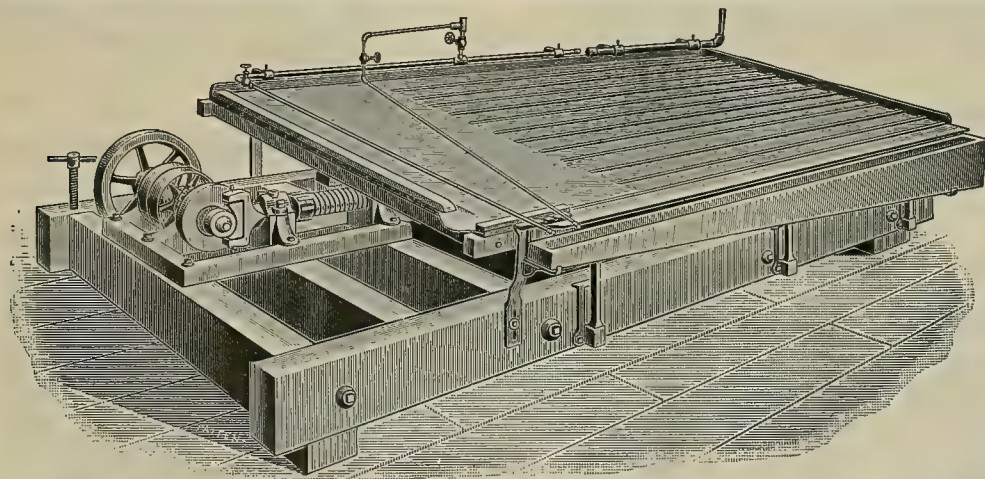
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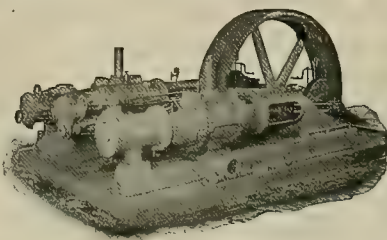
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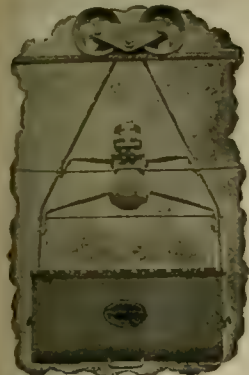
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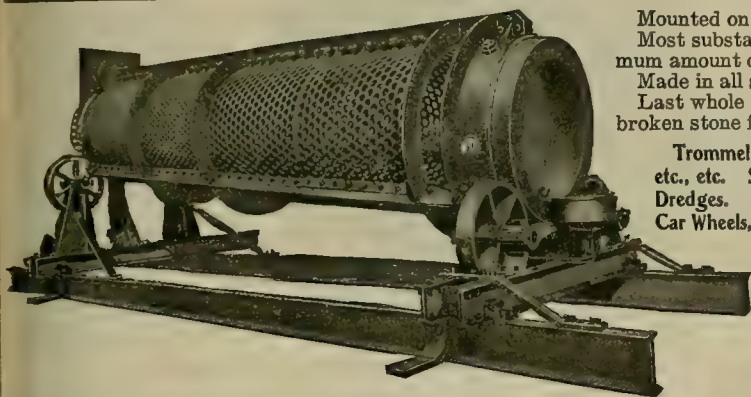
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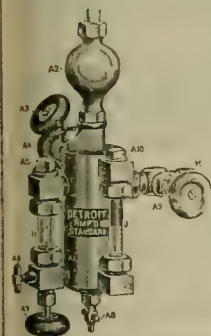
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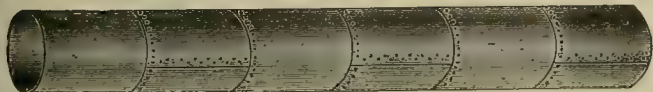
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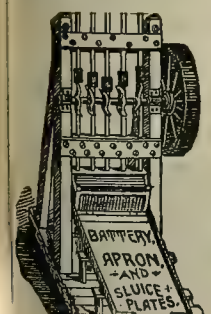
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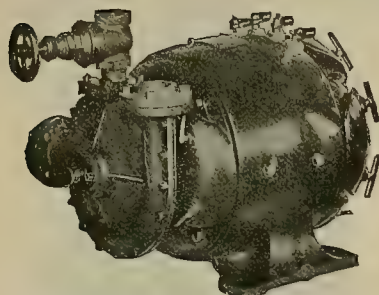
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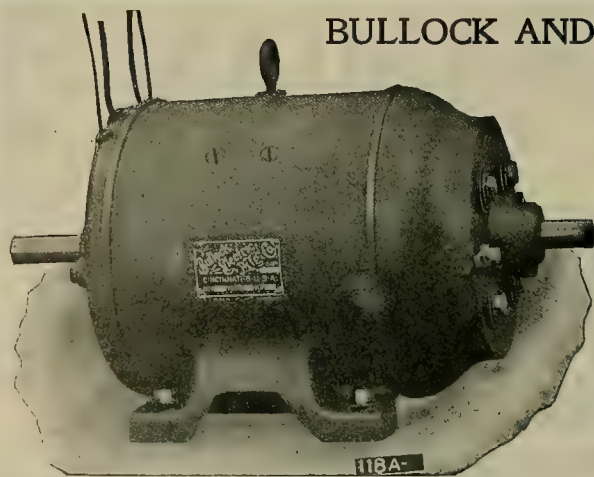
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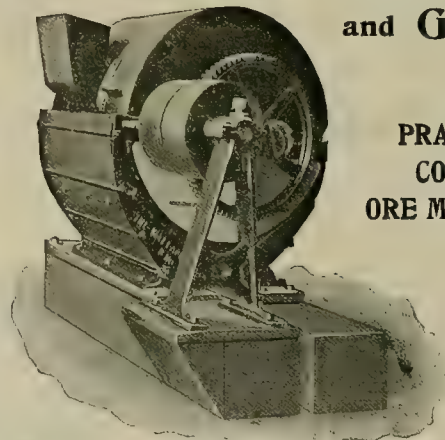
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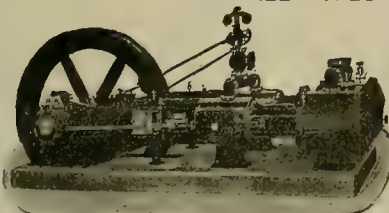
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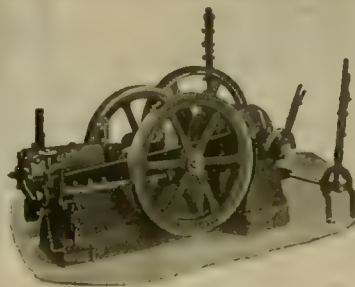
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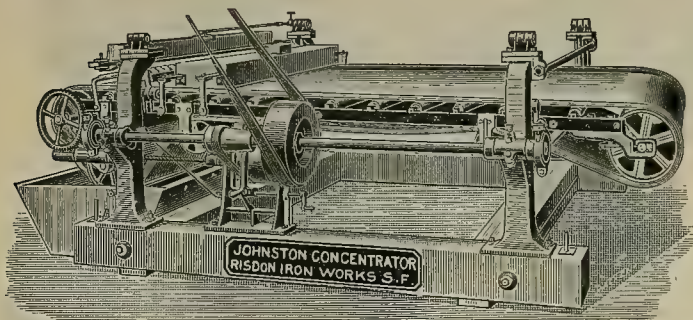


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Whole No. 2160.—VOLUME LXXXIII.
Number 24.

SAN FRANCISCO, SATURDAY, DECEMBER 14, 1901.

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The Philippine Miners' Memorial.

The American Miners' Association of the Philippine Islands has been organized at Manila. It has adopted a memorial to Congress which appeared in full in the last number of this journal. The prayer of the memorial is a request of Congress that it extend the United States mining statutes to the public lands of the Philippine Islands.

From the recitals it appears that between 1500 and 2000 American prospectors are in the islands taking up and developing mining claims, organizing local mining districts and establishing local laws and customs, just as they would under similar circumstances in the United States. It does not appear that at this time there is any disturbing element, except uncertainty as to the future. Such of the lands of the Philippine Islands as were not in private ownership at the date of the treaty by which Spain formally transferred sovereignty, are unquestionably public lands of the United States. The equity of title to them rests with Congress until it makes a grant of them. The functions of the Philippine Commission, so far as grants and the equity of real property titles are concerned, are administrative. The precedents of legal decisions are all against any other theory of their function. They would seem to have, so far as the mining claims already located are concerned, the rights of adjudication as between claimants, and would, in adjudicating rights, be compelled to recognize and apply the local laws and regulations of the miners. There are no other laws in existence that can be considered as in force for this purpose. The Philippine Commission, however, have as yet no laws under which they can adjudicate rights as between mining claimants and the United States. The continuing of the old Spanish statutes in force until Congress has substituted something else can only be construed as applying those laws to the adjudications necessary with respect to private rights that already existed by grant of the Spanish Government. They cannot be applied to mere possessory rights to mining claims which are not yet

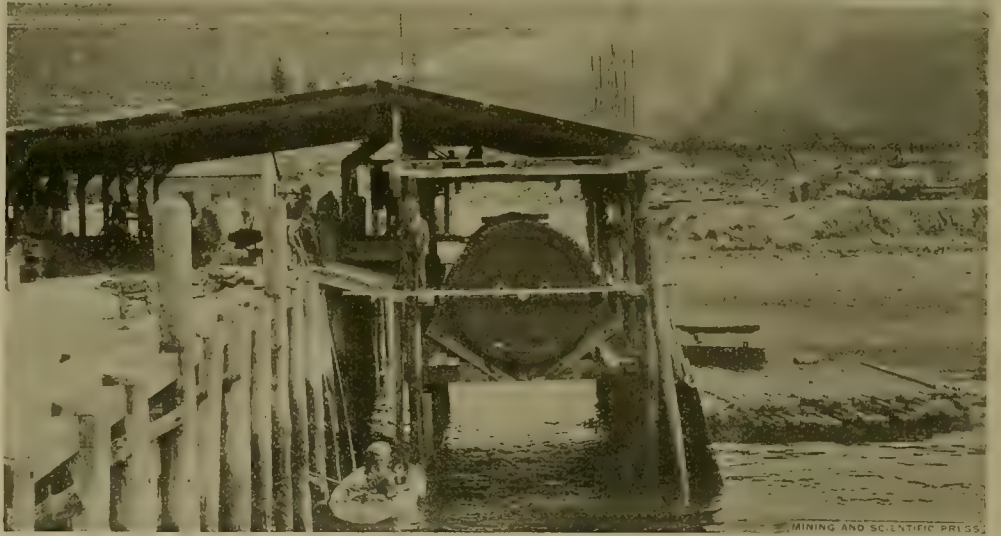
grants of title by Congress. They might apply if Congress, by grant, expressly validated the locations of claims already made, without at the same time providing by statute for the adjudication of the mining titles it created.

As matters are now, the Philippine Commission cannot interfere with the miners and prospectors. The latter have, it would seem, much the best of circumstances, excepting only the disturbing element of uncertainty noted above. There is no occasion to exaggerate this. Congress and the courts, which have had before them many times, identical questions to this one of the Philippine mining claims, will

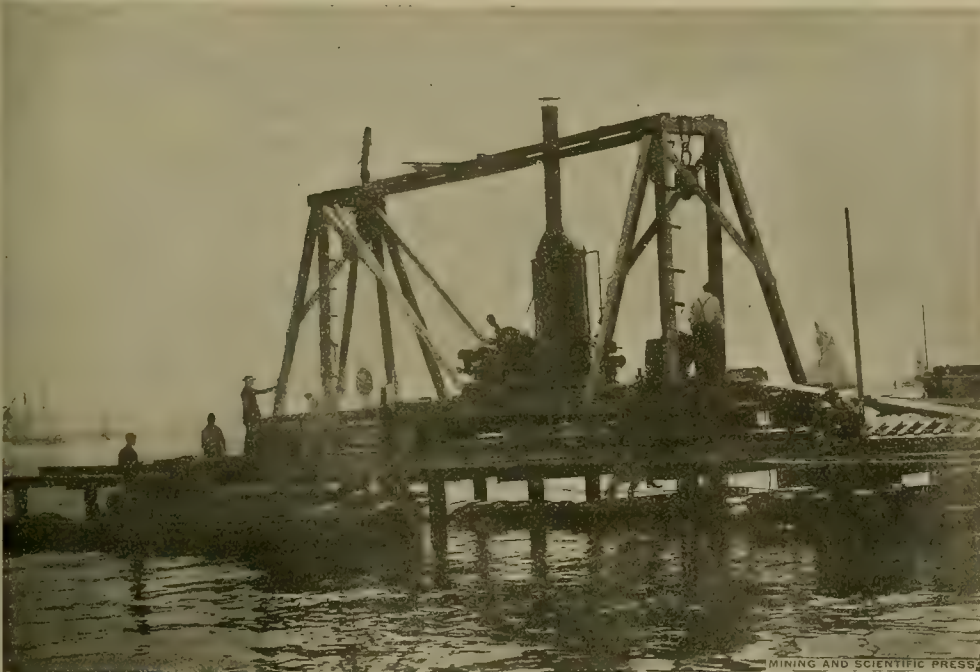
hardly depart from the settled practice they have established. It may be accepted as assumed beyond question that they will recognize and validate all mining claims that are made before they pass mining laws, and all mining laws, customs and regulations that the miners themselves establish will be recognized and accepted. They may, however, substitute other conditions of grant for mining claims made subsequent. Here is the real danger to the Philippine miners. It is better for them to have no mining laws, except such as they themselves make, rather than have a code of laws which will not fit the conditions as they are in the Philippine Islands. The example of Alaska miners, struggling under misfit laws, should be sufficient in this respect. Also, when mining laws are made for the Philippines at least one provision in the laws of the United States should be eliminated. There should be no grant of extralateral rights. The mining claims that now exist in the Philippines as Spanish grants have no such rights. There is no reason for granting such rights to new claims. It is only conferring on the Philippine mining industry a heritage of never-ending litigation.

It may be urged as a ground for action by Congress that there is no law under which mining claims in the Philippine Islands can be patented. This, if anything, is rather an advantage. Public policy is better served by having the mines continuously worked as possessory claims, than by having them remain unworked as patented claims.

The memorial would seem to have been hastily prepared, in anticipation, perhaps, of anticipated legislation less favorable than the existing United States mining statutes. This last is, however, exceedingly unlikely to occur, and a formal investigation by Congress as to what the miners and prospectors are doing for themselves, precedent to its action by legislation, cannot operate to the ultimate disadvantage of the miners. The statement of the memorial that there are between 1500 and 2000 prospectors and miners now at work in the islands speaks exceedingly well for their prospective mineral wealth.



Building Deer Island Submerged Conduit Tunnel in Cradles, Boston Harbor, Mass.—(See Page 256.)



Lowering Section of Submerged Tunnel Conduit, Deer Island, Boston Harbor, Mass.—(See Page 256.)

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San Francisco, December 14, 1901.

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Late Gold Dredging Practice.

In this issue appears the concluding portion of a paper on late gold dredging practice, by R. L. Montagu. The data are up to date. Mr. Montagu's late professional work has been in the Oroville, Cal., gold dredging field, where there is more gold dredging being prosecuted than in any other equal area, and where all the novel problems that have come up in the industry have been successfully worked out.

The paper, it will be noted, is particularly clear and complete on the details of electric power application. This is the latest novel feature of gold dredger construction and operation. Not at all an essential element, it is value and profit in that it reduces costs and increases efficiencies. That it should so rapidly have become a feature of the business is strong evidence that the mechanical problems connected with the removal from place of the gold bearing deposits, and the recovery of the gold from them, have been satisfactorily solved. The application of electricity to an industry is of the nature of the finishing work of decoration to it.

Mr. Montagu's statement of the possibilities and limitations of the industry are worth considering by prospective investors in gold dredging enterprises. The business is fascinating so long as it remains untried; ultimately it may become as commonplace as digging potatoes. But until it does become commonplace there is danger to the prospective investor from expecting too much of it. This should be avoided, and the conservative discussion of the subject that this journal has given in such elaborate detail is intended to that end.

THE value of a technical journal to its readers is entirely in the use made of the information that it publishes. All that one working in mining or metallurgy would need to know is not comprised in a single issue of the MINING AND SCIENTIFIC PRESS or any other technical journal. All that one would wish to know or could know in any of these special lines of work does not become published. But the student or worker can keep himself in touch with all that is new in his line of investigation or work, and keep himself up to the highest possible standards of efficiency by taking the technical journal that deals with his specialty and making use of the new information that it is constantly diffusing. These lines are suggested by letters received by this journal in which the writers acknowledge its service to them in their specialties. The method they employ should have the sincere compliment of imitation. Each for his specialty makes a scrapbook of clip-

pings from this journal which relate to his specialty. For one it is the cyanide process, for another gold dredging, a third is studying the wet metallurgical processes. Such a scrapbook keeps the historical sequence of advance in an art, and graphically presenting it as a whole, aids the selective faculty of the mind. There is so much to learn in any art that avoidance of having to unlearn anything is the best kind of labor saving. The readers of this journal will find it even more valuable and indispensable to them in their work if they collate and use the information it publishes on their specialties.

Copper Mines and Copper Miners.

Nearly three years of 17 cents a pound copper, contrasted with twenty-five years preceding of copper selling from 7 to 11 cents a pound, is responsible for an enormous sum of existing investment in the business of copper mining. Now that 17 cents a pound copper is passing into history, an estimation of its permanent effect on the industry is a timely matter of consideration for the owners of copper mines.

In this consideration there are three elements of which account is to be taken: They are the copper mines; the copper miners, who are the people who mine copper for the legitimate profit margin between cost of production and market selling price, and the copper mining stock speculators. This last has special reference, not to people to whom stock in copper mines is an investment in a safe mining business, but to a lesser number to whom stock in copper mines is an opportunity to mine—not for copper—but for the capital of the others supposed by them to be invested in a safe mining business. This last described element in the business has been and is still in public interest the leading one.

Ostensibly the business organization of a great industry into its logical industrial position, the Amalgamated Copper Co., has proven itself really to be nothing more than the business organization of a great gambling device. In a garb of more accepted responsibility and a change of place, the operators of this corporation have differed only by the greater magnitude and boldness of their work from the people who made the same game with the Comstock silver mining as an opportunity. The methods have been the same. The results are if anything more a misfortune. The stimulation of gold and silver mining by the Comstock stock speculation created no competition in metal production, which lowered the natural profit of the business. The stimulation of copper mining has created a competition which is lowering profits and will continue to for a long period of time in advance.

The Amalgamated Copper Co. was organized publicly in the spring of 1899. Privately, the organization started nine months earlier, in May, 1898. Between these two dates the organizers gathered together the stocks of several large producing mines, and where they obtained a majority interest took control through their agents. The consumption of copper was known to be exceeding current production and absorbing the stored surplus. This journal in July, 1896, called attention to the fact that consumption was increasing very rapidly and exceeding production—had very nearly absorbed the surplus. The next move was the raising of the price of copper, a very simple, easy matter at the time and under the conditions. With the time for the advance decided on in November, 1898, it was made an accomplished fact within sixty days afterward. With the public prestige of this accomplished fact the public organization of the Amalgamated was made. The operators constituting themselves the future managers invited the public to supply the money capital.

The managers of the money contributed by the public, they, with the consent of that public, exchanged it for some of their accumulated copper mining stocks—not all of them—taking a money profit of the difference between the price they paid for the stocks in 1898 and the open market price in 1899, when the company was organized.

The price of copper was easily maintained. Time is required to make copper mines—two to three years at the least. The company paid large dividends regularly and the stock became an investment. Stock in copper mines fluctuated greatly. Amalgamated was steady with gradually gaining market

quotations as the feeling of security of investment in it gained with the public. Meanwhile the money released to the managers by the taking over of their stocks was used to extend their stock ownership and control of other mines—notably the Boston & Montana and Butte & Boston—which they had not yet turned in to the company. Withdrawing these stocks from the market the quotations naturally gained. The demand for them could not be supplied outside of the locked-up stock.

In May of this year the next step was taken. The managers exchanged stock for stock this time. Amalgamated was 30% above par. Measured by the apparent earnings the exchange was made on an apparently even basis. No serious attention was paid to the fact that these stocks had appreciated in market quotation very much more than 30%, and that the exchange, owing to the difference in gain, became in fact a change of paper profits for cash profits—the cash of the public that paid in the original capital of the Amalgamated.

The final step has been the realization of these money profits. In the court proceedings in New Jersey the managers of the Amalgamated Co. disclosed their personal holdings of that stock. They were a relatively insignificant per cent of the total capitalization. They were then in on the Boston & Montana and Butte & Boston end of the proposition. The hearing did not disclose how large their personal holdings were in these stocks. When the exchange was made they had only to sell their new certificates of Amalgamated on a market steadied by the \$75,000,000 of actual money contributed by the public to the capital investment in it. This they would appear to have done.

Meanwhile the production of copper had been increasing and a stock had been accumulating. A much greater increase of production was imminent. In the lighting up of the dark ways that attends on misfortune met in them, the public has been seeing with increasing clearness what manner of operation the Amalgamated Copper Co. is.

It may not inaptly be described, as miners will understand it, as a highly respectable faro game, with dealers, bankers, lookouts, cappers, a brace-box, chips to suit all pockets, and the ordinary percentage in favor of the game supplemented by the most effective sure-thing device in the world—Wall street, New York.

The great game is over till the public forgets again. There are still copper mines and there are still copper miners. The latter from watching the game must now turn to watching the mines. Copper at 17 cents meant the operation of many mines that cannot be profitably operated with copper at 12 cents or 10 cents—or it may be less. Other mines must restrict their output by leaving in them the lower grade ores. Both causes will contribute, by checking production, to sustain the price at a balance point where production and consumption become equal. This cannot occur, though, until the surplus is absorbed. A lowered price will, however, clear this last away rapidly by bringing the metal into new uses for which it is now too high priced.

The problem for the miner will be the estimation of where the new price level, after the surplus is out of the way, is going to come. Will it be below or above his cost of production? is the question. Copper mining is no longer the comparatively simple problem of the native copper Lake Superior ores. The bulk of the production comes now from ores in which copper is only one of not less than three metal values, with wide differences in different mines in the respective value ratios. These will make the essential commercial differences. In this connection it must not be overlooked that silver has lost materially in market value, and its future sale price must be estimated on as well as that of copper.

The copper mines that carry gold values are safe to be found the most desirable. In the end, too, the mines that can sustain their own reduction plants will have a considerable economic advantage over mines that depend on custom treatment plants. Finally it can be accepted that the situation is not fully cleared yet, though one uncertain factor has been largely discounted out of it. It would seem improbable that belief in the power of a combination to maintain the copper price far above a natural level, would soon again become the dominant belief of the capital owning public.

Concentrates.

MERCURY is worth \$53 per flask in Denver; \$48 in San Francisco.

NO BONUS has been offered by the U. S. Government at any time for the discovery of tin ore.

SO FAR as known there has been no process discovered for tempering copper that is of commercial use.

THE T-rail used in a long mine tunnel should have a broad, heavy flange to give it a long period of use.

THE tariff on scrap mica is 6 cents per pound and 20% ad valorem. On the sheets when cut and trimmed it is 12 cents and 20%.

IN May, 1899, the Witwatersrand mines, South Africa, produced 466,000 ounces gold; in May, 1900, nothing; in May, 1901, 7478 ounces.

THE "lost mine" industry is not of present profit. Prospectors are too busy finding future values to notice those evanescent myths.

PROBABLY 100 gold dredgers have been built for work in this west half of North America, involving a total outlay of about \$6,000,000.

THE water standing 14 inches deep in a flume 30 inches wide, the end gates 6 inches above the floor, has a discharge of 3 miner's inches per second.

THERE is no market in California for tungsten ore. The Illinois Steel Co., Chicago, Ill., or the Colorado Iron Co., Pueblo, Colo., might be purchasers.

WHERE fireclay can not be had to repair muffles, a mixture of 1 to 2 parts litharge and 10 parts boneash, made into a paste with water, may be substituted.

THE corrosive action of the water in the Stanley mine, Idaho Springs, Colo., is not considered to be due to sulphuric acid in the free state, but to ferric sulphate.

MERCURY CHLORIDE is of rare occurrence. It has been found at New Almaden, Cal., and at Terlingua, Texas, occurring as a white bloom on specimens of ore.

BRIGHTENING will not alone preserve tools from rust. If gone over with an oil rag and put in a box containing whiting, covering them with it, they should be kept from rusting.

FRESHLY PRECIPITATED hydrated ferric oxide acts as a powerful antidote to arsenical poisoning by rendering the arsenic insoluble, both in water and in the secretions of the body.

AS ORES containing gold or silver do not act upon a magnetic needle, no "mineral rod" or "divining rod" electrically impelled will be of any material use in connection therewith.

DETONATING CAPS are about five times longer than percussion caps, and contain from seven to fifteen grains fulminate of mercury. Percussion caps have for filling niter and other ingredients.

IT sometimes occurs that in smelting gold ores containing copper a small amount of copper matte, rich in gold, is produced, a product not suitable for copper smelters, hence sold to lead smelters, where it is treated in the furnace charges as an ore.

THE theft of electric light has been made possible by the insertion of a small paper wedge between the magnet and the registering disk of the electric meter, thus preventing the disk from registering, although not interfering with the supply of current.

THE Southern California Power Co. carries electricity to Los Angeles from a dam on the Santa Ana river near Redlands, Cal., 33,000 volts being carried 81 miles. The plan of the Standard Electric Co. contemplates the transmission of 40,000 volts to San Francisco, Cal., 140 miles.

A COMPOUND MAGNET is made from thin steel magnets, each one carefully and separately magnetized as strong as possible, and then assembled by placing the same poles of all together, the strength being thus made much greater than that of a single magnet of the same weight.

SMOKE prevention is a measure of commercial economy in steam boiler plants. The actual loss of heat by reason of wasted gas which passes away in smoke is but a small per cent of the calorific power of the coal. The waste occasioned by a smoking fire amounts to from 10% to 20% in many plants.

THE Arkansas Supreme Court has ruled that \$100 worth of work had to be performed as the annual assessment work on claims, irrespective of the number of days required to complete the work. The local miners' regulation that twenty days' labor was the assessment work that would hold a claim was invalidated.

WITH 160 revolutions per minute, the engine flywheel, having a maximum rim speed of 5000 feet per minute, should have a diameter of 9.9 feet. The approximate weight in pounds per horse power in rim of wheel would be 36.9; the approximate weight in pounds of the whole wheel per horse power would be 51.6.

NO PRICE can be quoted for "an assay of ore," as everything in that line depends on individual requirements. Prices run from 50 cents to \$10. It is not a matter of competitive bids; better pay a first-class assayer a good price and get accurate results. "Cheap" assays are sometimes very dear. A good assayer can't afford to do "cheap" work. In sending ores for assay it is well to be sure of the samples, and necessary to tell

the assayer for what metal or metals the samples are to be assayed. A sample weighing eight ounces is ordinarily enough. Assaying is an art in itself and the artist earns what he charges.

LODE TIN VEINS in Kuantan, Pahang, Malay, range from 2 to 10 feet in thickness, are from 50 to 2000 feet apart, and trend east and west, underlying both north and south, at angles ranging from 10° to 40° from the vertical. In the district mentioned, about 3000 tons are mined per month, yielding 3½% tin oxide to the ton.

WHERE the location of a mining claim is void because of the absence of a valid discovery of mineral, a subsequent discovery of mineral after the filing of the location certificate, and after all acts of location have been performed, will validate it, if such subsequent discovery is made prior to the attaching of the rights of a third party.

A COPPER MINE at Falun, Sweden, has been worked continuously for 700 years. This ancient mine has yielded 500,000 tons of copper, 15 tons of silver and 1½ tons of gold, representing a value of \$277,500,000. Its greatest production of copper was in 1651, when 3066 tons were produced, and the lowest was in 1883, when 388 tons was the yield.

SPEAKING GENERALLY, amalgamation is slightly aided by heat and as slightly hindered by cold. There are many millmen who favor heating battery water, but the practice is not universally commended. Amalgam, ordinarily, contains more gold in winter than in summer, probably because the warmer water makes more fluid the amalgam. An amalgam that would retort 40% in summer might retort 45% in winter.

MANY mills, run by steam power as a matter of economy in fuel, have adopted the method of heating the water used in the boilers by means of the exhaust steam, using the same water on the plates and concentrating tables. The saving of fuel in some cases amounts to 50%, the water going into the boiler at a temperature of about 90°. By the time it reaches the plates and tables in an open conduit the temperature is reduced to 70° or 80°.

CORUNDUM is found in veins in North Carolina, and in irregular deposits in Chaffee county, Colo. The former averages 15%, the latter 30%, corundum. At Sapphire, N. C., the rock corundum is crushed and ground to No. 12, the sand corundum sluiced from the mine, fed to coarse-punched iron screens, then reground, washed and dried. The average price at the mill is 5 cents per pound, ranging from \$60 to \$200 per ton. The market is limited—fluctuating.

AT various times tin has been reported to exist in different sections of Montana. "Stream tin" has been found on both forks of Clancy creek, in the placer wash, and on their tributaries. The formation there is granite and red shale. In 1876 a bar of tin was run from this ore by H. M. Hill of Clancy and forwarded to the Centennial Exposition at Philadelphia. Tin ore is also found in Meagher county, along many of the streams having their source in the Little Belt range.

A MINING LOCATION can be held by assessment work done for the location on an adjoining claim which is patented. Work which is done in the ordinary business of mining the patented claim will not count as assessment work for the location claim. Where the owner of a location is performing the annual assessment work off of the claim, particular care must be taken that the intent and object of the work is so clearly the location for which it is done that it cannot be questioned.

IN a recent mill test at Hedges, Cal., a back plate which had been in use for several years and against which thousands of tons of ore had been splashed, was melted and assayed. Previous to melting the plate was scraped as at an ordinary clean-up, but not perfectly clean. The assay gave it a value of 25 cents a pound, which was probably all on the surface. To determine this, samples were taken from a cut clear through a similar plate and filed clean. Ten grams dissolved in nitric acid without leaving a trace of gold.

WITH the progress that has been made in the milling of ores, the simple methods now in use and the light cost of constructing a plant as compared with that of a few years ago, advanced miners consider that there is no excuse for permitting "low grades" to go over the dumps or remain standing. Their policy is to fill in the deficiencies of nature, and, where the minerals have been deposited in less than commercial quantity, to remedy it by concentrating to two tons or ten tons, if need be, to get them into commercial form.

WHERE a vein is discovered in driving a tunnel at a point 250 feet below the surface, a valid location of the claim can be made by marking the boundary of the surface at the place at which the vein, if the vein continued to the surface, would be disclosed, though no surface work is done, and no actual tracing of the vein to the surface is attempted, and though the tunnel was not being located under the Tunnel Site Act of Congress, and was driven through patented property, not belonging to the owners of the lode discovered.

THE plan of using the water which has been used on one overshot water wheel on another below it and transmitting the additional power back to the shaft of the first wheel, which is geared direct to the vertical shafts of an arrastra, is practicable, and the simplest way, except by more water being used on the first water wheel, of getting the additional power needed. The two pulleys on the two wheel shafts should be the same diameter if

the wheels are the same diameter, and the wire belt or rope drive should be large enough to transfer the power of the lower wheel to the upper. The power of the upper wheel could be transferred to the lower if desired. It may be more convenient to locate the auxiliary wheel above the one which is loaded with the work.

TO MAKE a valid location of a quartz claim under Section 2320 of the United States Revised Statutes, a vein or lode of quartz or other rock in place bearing gold, silver, cinnabar, lead, tin, copper or other precious metals must be discovered. It is not necessary that the walls of the vein should be within the lines of the discovery shaft. If a vein or lode or other rock in place bearing mineral has not been discovered, then the location is not a valid one. The vein may be very thin or many feet in thickness. The width of the deposit, or whether it is rich or poor, is not material, neither is its regularity.

A MONTANA mine manager writes: "I have the best work on cyaniding in existence. It is a scrapbook made up of practical articles on the cyanide process clipped from the MINING AND SCIENTIFIC PRESS." A California mining engineer writes: "The best and most accurate compendium on building and operation of gold dredgers that I know of is a lot of clippings that I have arranged on that subject from the columns of the MINING AND SCIENTIFIC PRESS." A Colorado mine superintendent writes: "I know of no better work on concentration than that I have secured by selecting some of the many admirable articles on ore concentration in the MINING AND SCIENTIFIC PRESS."

IN CALIFORNIA, under State statute of April 23, 1880, it is not lawful for the directors of a mining corporation to sell, lease or mortgage all or any part of the mining ground of the corporation, unless such act be ratified by the holders of two-thirds or more of the capital stock. Where less than a legal quorum authorized the giving of a mortgage on the mining ground of the corporation, which was held invalid, but which act was confirmed by two-thirds of the stockholders, it has been decided that the statute did not confer on the stockholders the power to validate an invalid act of the directors, nor could they, without the board of directors having first lawfully acted, give a mortgage on the corporate property.

THE owner of a quartz claim is not confined to one shaft for a discovery. If he has not what proves to be a valuable discovery where he supposed it to be, in his discovery shaft, but makes a good and unquestionable one outside, he can hold his claim and patent it. A claim cannot be legally held without a discovery of a vein or lode of quartz or other rock in place bearing some mineral. The United States mining law distinctly declares that "no location of a mining claim shall be made until the discovery of the vein or lode within the limits of the claim located." If the claimant has no legal right to the ground by virtue of a valid discovery and a proper location and record of it, then he has no right to a patent for it.

REGARDING stopping a lense down to ⅛ inch, it depends upon the size of the plate to be covered, as the amateur stopping a lense down as much (and trying to take instantaneous views) will not meet with success. In photographing mines and mills, a short-focus, wide-angle lense is necessary, as there is not the distance necessary to use a long-focus lense without sacrificing much of the picture. Celluloid films rarely give the results that can be obtained with dry plates. In photographing mines where the light is poor, it is necessary to use the flashlight. Better results will be obtained by giving two flashes, one at each side of the camera, as it will do away with the heavy shadows which result when only one flash is used. In photographing machinery where some part is wanted to show particularly, by whitewashing the same, the finest detail will be preserved.

SOME ASSAYERS say that as between "pot" and scorification assays the latter are more satisfactory, claiming that in scorification there is less slag absorption, cupel absorption or volatilization. While scorification in muffles is a tedious process, scorifying the sample in a small wide-mouthed crucible in a Cornish fire, with heat and draught properly regulated, is reported entirely satisfactory. To about three grams of ore are mixed in twenty-five grams granulated assay lead and a small quantity of a flux composed of equal weights of carbonate of soda and borax. Subsequently another quantity of twenty-five grams granulated lead put in is covered with a further quantity of flux, the crucibles then placed in a full fire at a low heat, when melted the bricks being opened, the damper raised, causing a current of air that occasions rapid oxidation and a thorough scorification.

A ROUGH AND READY WAY of separating and refining gold and silver in an impure slug or little bar containing gold, silver and copper is to melt it and pour it into cold water, causing granulation. The grains having been panned out from the slag are to be dissolved in concentrated C. P. sulphuric acid of 65° density, this being best done in a glass beaker, the gold remaining as a black undissolved powder, the silver and copper going into solution, which is to be poured into a glass vessel in which are packed isolated copper strips, the silver being precipitated as a white powder on the copper, susceptible of being brushed off and fused into a button. The remaining solution, when poured into a glass vessel containing bright wire nails, will give a copper precipitation in the form of bright red powder. In each of the three cases the resultant powder is carefully collected, washed three times and as carefully dried before final melting.

A Novel Method of Tunnel Building.*

By HOWARD A. CARSON.

The Metropolitan Sewerage Commission of Boston, Mass., in carrying out their plans for the disposal of the sewerage of the large district surrounding the city of Boston, has been compelled to build a number of submarine tunnels, crossing rivers and straits and finally out into the open sea, from Deer Island, at the entrance to Boston harbor. None of the tunnels had to be very deep beneath the water surface, so that it became possible to experiment with novel methods of construction.

One method employed a coffer dam and pumping plant. The coffer dam consisted of piling and sheet piling around a small section of the line. After the dam was made it was pumped out and kept free of water while a trench was excavated and the sewer tunnel built of brick and concrete in the trench. This method of construction cost as high as \$90 a foot. The increasing difficulties that were encountered in constructing from Deer Island out into the open sea ultimately forced the abandonment of this plan.

In the crossing of Shirley Gut, which separates Deer Island from the main land, the coffer dam method had not been practicable owing to the strong tides. The method used there had been to build the sewer or tunnel in sections of brickwork lining encased in thin steel shells. These sections were built on ways, as shown in the illustration, the ends were bulkheaded, they were then launched, towed to place, submerged by admitting water and joined together by divers. Finally

water. They were partly hoisted and partly pulled off the rollers, blocking the rails on the second following high tide, and were then towed to the proper position to place in the siphon.

The pipe sections for the outlet—southerly end of Deer Island—were made in "cradles" at the sides of a wharf, illustrated on the front page. These cradles were each made strong enough to hold the pipe sections, 52 feet long, and weighing upwards of 210,000 pounds. These cradles could be lowered by machinery at will and thus place the finished pipe in the water, where it could be towed to the outlet, distant between one-half and three-fourths of a mile.

CHARACTER OF EXCAVATED MATERIAL.—Sand and gravel, with stratum of black mud mixed with sand.

Cost of dredging \$12,050 00
Cost of dredging per linear foot 13 40

PILE WORK IN TRENCH.

Cost for piles and labor \$3,400 00
Cost for caps and bolts 200 00
Cost per linear foot for same 4 00

SILLS.

Cost of labor and materials \$840 00
Cost per linear foot for same 94

CRADLES FOR BUILDING PIPE SECTIONS.

Cost of piles and labor on same \$600 00
Cost of materials and equipments 1,800 00
Cost of labor 1,300 00

PIPE SECTIONS.

CHARACTER OF STRUCTURE.—Masonry pipes encased in wood lagging securely hooped. These laid in sections and bolted together by divers.

Description of a single pipe:—

Length 52 feet.

timber and concrete (to sink it) which fitted the pipe. Sills were blocked up and tamped until they were perfectly solid and had a firm bearing.

VERTICAL GUIDES.—To insure that the pipes should be lowered exactly into these cradles, vertical guides of T rails were placed with one end fitting into mortises in the sill.

CONSTRUCTION OF PIPES.—The pipes were built in cradles located at the new wharf, about $\frac{1}{2}$ mile from the trench where they were laid.

Thirteen strong ribs, each having a built-up semi-circle of 9 feet $3\frac{1}{2}$ inches diameter, each rib supported at each end by a $1\frac{1}{2}$ -inch steel rod, with thread which fitted a 12-inch diameter cast gear nut. Four-inch spruce lagging, 6 inches wide, was laid up to springing line and bolted to a steel angle hoop at each end of the pipe. These angle hoops were used to bolt together continuous sections of the pipes when laid. The shell of concrete was 6 inches thick and mixed with volumes as follows: Cement, 1; sand, $1\frac{1}{2}$; beach gravel, $3\frac{1}{2}$. The brick shell was 3 inches thick, and the inner ring was left toothed for making connections with adjoining pipes. After the pipes were braced internally 6 feet apart by both vertical and horizontal 4x6-inch braces, bearing on 4x6-inch stringers running longitudinally, the bulkheads were put in. The bulkheads were of 6-inch spruce, caulked and secured by 1-inch iron rods to vertical 6x8-inch posts built into the brickwork about 8 feet from each end of the pipe. The bulkheads were inside the concrete layer of the pipe, and were drawn against the brickwork by the iron rods. In the forward end of each section of sewer pipes two 2-inch wrought iron pipes, to be used later to let in water, were placed so as to extend quite through the entire bulkhead. These pipes were plugged from the inside, when first made, with pine. After a masonry pipe section was sealed up it was examined for tightness by partially exhausting the air. The least perfect vacuum recorded on any pipe was 6 inches of mercury; the best was $13\frac{1}{2}$ inches. A pipe was used to allow air to escape when letting in water to sink the pipes. The pipe as thus completed was painted with asphalt to protect the wood from limboria and teredo before it could be covered in the trench with earth. A rubber gasket 1 inch thick and $2\frac{1}{2}$ inches wide, having an exterior diameter of 8 feet $5\frac{1}{2}$ inches, was then fastened to the end of the pipe by nailing it to the wooden shell. The pipe was then ready for launching.

LAUNCHING.—The pipes were launched by lowering the pipes and cradles into the water at high tide. After the pipe was about two-thirds submerged, rafts made of oil barrels, having a floating capacity of 5000 pounds each, were attached to the ends of the pipe section. The attachments were made near the top of the pipe, in order to keep it while floating in the same position as while being built. When the pipe and rafts had been submerged until the top of the pipe was about 1 foot above the surface of the water, it floated from the cradle. The pipe was then pulled out of the cradle and was ready for towing. About $1\frac{1}{2}$ hours were consumed in removing and lowering a pipe from the cradle, and about twenty minutes were necessary to raise the cradle into position ready for making a new pipe. A towboat was used to take the pipe to the trench prepared for it.

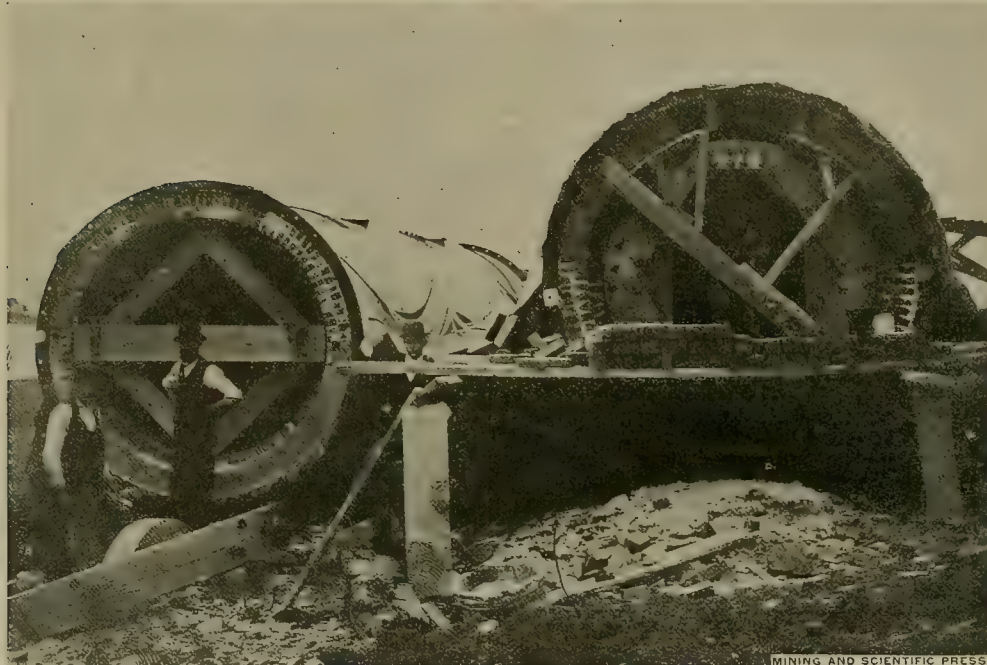
LOWERING PIPES INTO POSITION AT THE OUTFALL.—This was done by a system of traveling shears running on the temporary pile work. The operation is illustrated on the front page. To control the pipe while being lowered and to insure its proper placing, vertical guides, previously described, were used to prevent lateral movement, and check ropes to prevent endwise movement were used. Each pipe was lowered about 6 inches from the end of the section previously laid. To bring the pipe back against the previous section, a windlass was placed about 50 feet back, from which a rope led to the pipe. Telltales were rigged so as to show if the pipe varied from a horizontal position as it went down. Everything being ready, the diver opened the two 2-inch holes in the end of the pipe by driving the pine plugs inward. At the same time the 1-inch test pipe at the top of the section was opened to allow air to escape. In about four minutes the pipe had received water enough to sink it, and the diver plugged the 2-inch holes, this time from the outside. The small test pipe was also closed. Just before the pipes rested on the sills, the winch behind was used to pull the pipe section back to the preceding one; after which the pipe was adjusted exactly to line and grade. The pipe section was then bolted to the preceding section by forty hookbolts. The joint between the two pipes was made perfectly tight by means of the rubber gasket.

COMPLETION OF THE INTERIOR OF PIPES.—As fast as the pipes are laid and back filled, the end bulkheads are removed, the water used in sinking pumped out and the masonry completed. Several pipes, however, intervene between the outermost one and that in which bulkheads are being removed. But one joint was found to leak, and that no more than would come through a $\frac{1}{8}$ -inch hole with 25 feet head. The leak was easily stopped.

All material was removed from and brought into the sewer by means of a manhole on shore.

Light was furnished for work inside the sections by a Westinghouse dynamo.

[The novel construction that is described in the



Bulkhead Construction in Submerged Tunnel Siphon, Shirley Gut Crossing, Boston Harbor, Mass.

the bulkheads were taken out, making a clear open way.

It was decided to make use of a method somewhat similar to that adopted for the Shirley Gut crossing, to complete the seaward extension of the Deer Island terminal that could not be built by the coffer dam method. It was thought that if for the steel used for shells in the Shirley Gut work there could be substituted wood, the sections, when sunk in the harbor and covered with earth, would last much longer, would cost considerably less and have other advantages.

It may be stated, however, that neither the steel nor wooden shells are necessary for the permanency of either of these works. Experiments were made by Assistant Engineer William W. Lewis to test the points above mentioned. The strength to resist bursting pressure of oak hoops joined with copper rivets was determined. A pipe about 16 feet long, with an external diameter of 5 feet 2 inches, made of 2x4-inch spruce lagging, with an inner shell of Portland concrete masonry 8 inches thick, with an interior clear diameter of 3 feet 6 inches, was made at Chelsea creek and bulkheaded. It was found that a vacuum of 14.5 inches was very quickly and easily obtained, showing it to be watertight. As a result of the studies and experiments, the design of pipe and method of constructing and laying it, here described, was decided on.

Another marked difference in the method of construction of the outlet sewer and that of the Shirley Gut siphon will be noticed. In the Shirley Gut siphon the pipe sections were made on the beach, a little above high water, and were launched by moving them down the beach on rails, rollers and blocking at low

Greatest diameter (outside) 10 feet $1\frac{1}{2}$ inches.
Thickness of brickwork 8 inches.
Thickness of concrete 6 inches.
Thickness of spruce lagging 4 inches.
Hoops (white oak) 4 inches by $\frac{3}{4}$ inch.
Total thickness of pipe 18 inches.
Internal diameter 6 feet $3\frac{1}{2}$ inches.
Weight of pipe in air 210,000 pounds.

COST OF BUILDING PIPE SECTIONS.

Approximate cost per linear foot of pipe \$24 70
Approximate cost per cubic yard of brickwork 11 70
Approximate cost per cubic yard of concrete 8 40

Approximate cost per linear foot of excavation, masonry and wooden shell, including labor, material, pile foundation and miscellaneous expenses \$54 15

Because of the strong tidal current across the trench, it was necessary to construct a temporary breakwater. This was parallel to, and located at first 75 feet and later 100 feet from, the center line of trench on the east side. It was built by driving piles 8 feet apart, covering these longitudinally with 4-inch planking up to half tide, and filling dredged material on both sides. After the trench for the sewer was dredged, piles (45 feet) were driven in bents of two, there being five bents for each 52 feet length of pipe. Three bents of the five were spurs. These bents were capped at elevation 114 with 4x10-inch spruce girder caps, upon which stringers were laid to carry the lowering apparatus.

SILLS.—Sills were made as follows and secured to the bents of the piles by bolting: They consisted of 8x8-inch spruce which lay on top of a box of concrete. The box of concrete was fastened to the sill and was used to cause the sills to sink. Such a sill, when sunk, could easily be handled by the diver. The two end sills for each pipe had a circular cradle made of

* Condensed from Report of Metropolitan Sewerage Commission of Boston, Mass.

preceding has special interest from the application of similar constructions, the difference being differences of detail merely, to provide large volumes of water for power and milling plants from lakes and stream waters that freeze over in winter. Incidentally, a water supply free of mechanical impurities is obtained by taking it farther away from the shore. Several of the lately constructed power and milling plants of the Lake Superior copper mines have installed submerged tunnel conduits for this purpose. The large electric power plant of the Metropolitan Street Railway Co. at New York has such a tunnel 12 feet in diameter, extending out into East river, to supply condenser water.—Ed.]

Mountain Roads.*

NUMBER III.—CONCLUDED.

By JAMES W. ABBOTT.

THE BEST PRACTICE IN CURVES.—The minimum curve allowable on mountain roads has the arc of a circle with a 30-foot radius for its outer edge. All sharp curves and their approaches from each direction should be level. This principle, of such great importance to the efficiency of mountain roads, is generally either not understood or ignored. A moment's reflection will convince anyone that safety demands it, and that on such sharp curves a four-horse or six-horse team, to pull its maximum load, must not have any impediment from grade, as the wheel horse does most of the pulling.

All curves on steep grades should be equated (the grade lightened) and the roadbed widened. No universal rule for this can be laid down, but the best practice demands it and good judgment in locating always considers it.

Where a road winds backward and forward up a hill in approximately parallel lines, the turns are called switchbacks. They are expensive and very undesirable. Where possible, they should be avoided, but when indispensable they come under the rule above laid down for minimum curvature and freedom from grade.

Wherever a bridge is approached by a curve its end should be flaring and the roadbed made wide and level. Curved approaches to bridges are, of course, very undesirable and should be avoided, if practicable.

STAKING OUT THE ROAD LINE.—Staking out of the road line must be done by a surveyor, with a transit and target rod, set each time at the height of the instrument (horizontal axis of the telescope). All grades can be determined with sufficient accuracy for wagon roads by angles of elevation from the horizontal. These angles are obtained from any table of tangents. An angle of elevation of 1 degree and 9 minutes gives a 2% slope; an angle of 2 degrees 52 minutes a 5% slope; an angle of 4 degrees 35 minutes an 8% slope; an angle of 5 degrees 43 minutes a 10% slope, and an angle of 6 degrees 51 minutes a 12% slope. An Abney level—also called a pocket altimeter—is a very valuable instrument in laying out a road line. With it one can make a preliminary reconnaissance without being burdened with a transit.

On sidehill grades we stake the outside of the cut at grade. Slope stakes must be set to determine where the inside line of the cut begins. These can be set with sufficient accuracy with a 12-foot straight-edge, a clinometer and a taping. An Abney level and a taping are better still. The surveyor can make himself a little table, which will show the distance from his eye to the foot of the slope stake for each five minutes difference in elevation registered by his Abney level for the various widths of cut to be used—one table for rock cuts and one for picking or plowing ground.

DETAILS OF CONSTRUCTION.—In constructing mountain roads a sidehill plow with reversible share is a *sine qua non*. The writer has seen six strong mules and four men working hard to run a furrow up hill, when two animals, attached tandem to a sidehill plow, and two men, could have done more work and with much greater ease. It is astonishing how rapidly a sidehill grade can be constructed with such a plow and a scraper. When the two lines of stakes are in—grade and slope stakes—you start right and you come out right. Your inside bank has the right batter and your road the full width you meant it to have. It is very common to see a contractor on a mountain road, who attempts to grade without slope stakes, find his roadbed too narrow. It is too late for him to use his plow, and he must widen out with pick and shovel, the last operation costing, perhaps, as much as the entire grading should have done if done rightly from the start.

SLIDE ROCK.—In the mountains we often find the hillside slopes covered with broken stone of various sizes. This we call slide rock. This slide rock may be very coarse and the surface extremely ragged, when it is called "heavy slide." It may be fine and bound together by soil, in which case it can be plowed. It may be fine and dry and run just like dry

sand when one attempts to walk on it or otherwise disturb it; this is called "fine slide rock." To construct a road in coarse slide we build a retaining wall on the outside of the grade of large rocks weighing not less than seventy-five pounds each. We then shape our roadbed, making it as smooth as possible with the material at hand, and cover this surface with fine slide. All rock retaining walls for mountain roads, when laid out dry should have a batter of one horizontal to two vertical. They should only be used where the filling behind them is coarse rock. If used to hold loose material with a batter of one to two, they may be gradually crowded out and the bank give away. If made less steep than one horizontal to two vertical to hold loose material, the method is too expensive to be ordinarily practicable. Coarse and rough and discouraging as heavy slide may look, the very best results may be obtained in it if the entire process is accomplished carefully and conscientiously. It furnishes an absolutely solid, perfectly drained road foundation, is unaffected by the elements, and requires less outlay for repairs than any other variety of mountain road.

Probably the most perplexing material which the inexperienced road builder encounters in building a road is fine slide rock. It appears to be so utterly unstable in every way that he does not know how to attack it, and it seems impossible to obtain either definite or satisfactory results. He can not plow or scrape it. Neither he nor his animals can keep their footing in it. Fortunately, patches of slide rock are never very long, and while the process of making a road across it is tedious and somewhat expensive, it can always be successfully accomplished.

The following instructions carefully observed will always yield satisfactory and gratifying results:

Stake out the grade line, setting the stakes about 25 feet apart and driving them down as firmly as possible. They will stay in place for a time if put in deeply enough. Slope stakes in fine slide rock are useless. As it always stands at about the same slope (35 degrees), the process is very uniform.

For a single track, put up another row of stakes vertically 7 feet below the grade stakes; for a double track, 10 feet vertically below. These lower stakes determine the foot of the cribbing which must hold the road. It is thus constructed: The logs should never be less than 10 inches in diameter at the small end, and the larger the better. The crosspieces should be uniformly 8 inches in diameter. That kind of available wood should be selected which experience has shown will rot most slowly, and all bark must be carefully removed. The logs need not be of any definite length, but the courses should always break joints. Now, beginning at the lower row of stakes with pick and shovel, make a bench, and on its outside edge carefully bed the bottom log. Then dig into the bank and bed each crosspiece. These should be 5 feet apart from center to center, with cross notches to fit triangular edges in the logs, just as house logs are fitted together. This notching should be done with much care to permit the logs to just touch, so that the crosspieces may be weakened as little as possible. The proper length for these crosspieces is 8 feet. They should never be bedded level, but always with a downward slope into the bank. With time and patience the lower row can be properly bedded and a good foundation for the cribbing secured. A dozen pointed inch steel bars driven in a row 3 inches apart, sloping into the bank, will help materially to hold back the slide while digging to bed crosspieces. Proceed to build up the cribbing, filling in with slide as the work progresses, remembering that the batter of the structure should be one to four.

When grade line is reached, there will be a 10-foot roadbed for single track and 16 for double track, fairly solid on the start and rapidly compacting with travel. Consolidation will be effected by a light dressing of some fine clayey material, if accessible, but this is not indispensable. Every road across fine slide must have careful attention. For all time fine slide will run down onto the roadbed, and it must be shoveled out occasionally, but this will not be a serious item of cost; in other ways the roadbed will be very satisfactory. It has natural drainage, the best of material is always at hand to fill ruts and chuck holes, and a hard, even surface can be maintained. The road grows a little wider each year. Cribbing thus constructed will last many years, and when it does finally give out, it will be found that a substantial foundation for the new road can be obtained without going nearly as deep as at first.

CORRUROY.—In laying out mountain roads we often encounter a spongy soil filled with water, especially above timber line. This almost invariably proves to be shallow with a substratum of good road material. This surface soil must be removed and a system of drainage adopted to keep surface water from running onto the roadbed. Occasionally corduroy is economical to meet such conditions, but it is a very undesirable expedient, and should be adopted only in extreme cases.

As in cribbing, all corduroy material should be the most durable to be obtained and the bark removed. The stringers should be not less than 10 inches in diameter, 30 inches apart from center to center, carefully bedded to an approximate level, and their tops adjusted for uniform contact with the covering

by the use of a long straightedge and adz. A row of 2-inch planking on each side, thoroughly secured by long spikes to each crosspiece, will prevent its rolling. If a crosspiece is occasionally bolted to its outside stringers, there will be no creeping. Lines should be carefully hewed for wheel and horse tracks. This is often overlooked, and corduroy then becomes an unbearable nuisance. Another mistake often made with corduroy is getting it too narrow. It ought never to be less than 12 feet wide for single track and 18 feet for double track.

A thorough system of both cross and longitudinal drainage must be adopted to protect the corduroy from quickly rotting and to keep its foundation from settling unevenly.

Rollers can rarely be used to advantage on ordinary mountain road grades, which, if properly constructed, will soon pack hard under the wheels of heavy teams. If wide tires were required by law, roads would be protected, heavier loads could be hauled, and expenses of maintenance and operation much reduced.

DRESSING.—All mountains are made of rock, the soil with which they are in places covered being merely a product of rock decomposition and water concentration. We can generally find a rock dressing prepared by nature within convenient distance of a mountain road. We sometimes find a complete material in one place and sometimes get better results by mixing two kinds. A hard rock in angular fragments makes an excellent road covering if we put some suitable fine material on top of it. Two inches is the maximum diameter allowable for any piece of road-covering material. Where the fragments are larger, it should be screened. Sometimes it is best to mix two kinds of rock, one hard and durable and the other disintegrating more rapidly through wear and chemical decomposition. Nothing ever takes the place of a rock covering for roads. It can always be cheaply obtained in a mountain country. If nature does not furnish a suitable preparation of it within economical distance, it can be cheaply prepared. Nearly any mountain county can secure a portable crushing outfit for not to exceed \$500, and can find material to use it on within convenient hauling distance of any road.

Most mountain roads at first require dressing only in stretches, and later for repairing holes and ruts and for maintaining a suitable inward slope. A covering of 3 inches is ample for a beginning. Six hundred tons of rock dressing will completely cover a full mile of single-track road, and on the average mountain road that amount would be sufficient for 2 miles.

If a road surface is to wear evenly, it should be homogenous—that is, it should not be built or repaired in spots with different kinds of materials; a clay road should not be patched with gravel nor a gravel road with clay. Whenever holes or ruts occur these depressions should be filled with material of the same kind as constitutes the road surface. Detritus, resulting from traffic, which is washed by rains into the gutters, should not be placed back upon the surface, for it has lost its power of cementation; it should be thrown away and replaced by fresh material. No perishable material of any description, under ordinary circumstances, should be permitted upon the roadbed, sod being particularly objectionable.

The Fire Test for Ores.

In the process of ascertaining the value of a piece of mineral-bearing rock the ore is first pulverized in a crusher or mortar. It is then quartered or split, until a sample is obtained small enough for convenient handling. A split is a series of troughs alternating with a series of slits equal in number and size to the troughs. Half of the sample is retained in the troughs every time the ore is passed through the slit. This process is continued until the quantity is sufficiently reduced. The sample thus obtained is spread upon a bucking-board, a metal plate fastened upon a firm foundation. It is then reduced to a powder by rolling it with a muller, which is a heavy iron sledge with a smooth convex surface. The sample is usually pulverized until it will pass through a 60-mesh sieve. In this condition the ore is called pulp.

The assayer uses weights, which are proportioned to the commercial weights, an assay ton, consisting of 29,166 grams, representing a ton of ore. The result of the assay is weighed in milligrams. If an assay ton of the pulp is used, each milligram in the result represents an ounce of the precious metal to the ton. Usually half an assay ton of the pulp is used, and the result is then multiplied by two to get the number of ounces to the ton.

A half assay ton of the pulp is weighed carefully on the pulp scales and put into a crucible, together with a flux, which consists of carbonate of soda, borax and litharge, or protoxide of lead. Sometimes flour is added. The proportions of the ingredients in the flux vary according to the nature of the ore. Some heavy lead or galena ores require very little litharge. Other ores which contain little or no lead require litharge in larger quantities. The pulp and the flux are thoroughly mixed and covered with salt or borax. Borax makes a clearer flux, but has no other advantage over the common salt. If there is an excess of sulphur in the ore, iron nails are added. The cru-

* From Year Book U. S. Department of Agriculture for 1900.

cible is then placed in the furnace, which has been heated to white heat to receive it.

The furnace contains a fireclay oven, a muffle, which is made with an opening at the back to permit the fumes from the crucibles to escape. Usually half an hour or forty minutes is required to reduce the contents of the crucible to a fluid state. When the action in the crucible has ceased the contents are poured into a metal mould and allowed to cool. The slag is then broken off and a lead button is found at the bottom of the mould. This lead button contains all the gold and silver in the ore. To separate the gold and silver from the lead, the button is placed in a cupel, a small dish made of boneash, and replaced in the muffle. The lead is melted, and part of it passes off in fumes, while part of it is absorbed, together with any copper or other substances which may be in the bottom, by the boneash, leaving a small silver button in the cupel. If the ore is known to contain much silver, the lead button is placed in the cupel just as it is taken from the slag; but if there is very little silver in the ore, a known quantity of pure silver is added, so that there may be a heavy excess of silver in the button obtained in the cupel. This is necessary in order that the button may be parted with acid.

The silver button is weighed on the button balance, and is then parted by immersing it in nitric acid. The acid dissolves the silver and leaves the gold in the form of fine black dust. The parting is done in an annealing cup. The gold is washed and dried and the cup is placed in the muffle and heated to a red heat, which anneals the gold, bringing it into a compact mass and giving it its true gold color. The gold is transferred to the tray on the button balance and weighed. The weight of the gold is deducted from the weight of the silver button, giving the weight of the silver. The button balance is a delicate piece of mechanism. It is kept in a glass case and the weighing is done with the case closed, in order that the air currents in the room may not affect the beam.

The Pachuca Stamp Battery and Its Predecessors.*

The invention of the arrastra for fine grinding is declared by some authorities to have been made by Bartolomeo de Medina, at Pachuca, Mexico, about A. D. 1557, which is quite probable. Being the first to amalgamate silver on anything like a commercial scale, he must have felt the necessity for ore-grinding apparatus of greater capacity than the old primitive millstones, and the arrastra was thus the natural successor of the millstone. It is very unfortunate that the archives of Pachuca, which have made so much history in ore treatment, were destroyed in some one of the many insurrections for which, also, the place is renowned.

The first application of the stamp to the crushing of rock is asserted by some writers to have been the invention of a Saxon nobleman named Von Maltitz, about the year 1505. Better authenticated reference, however, is made to one Paul Gronstetter, a native of Schwarz, and called an ingenious worker, who, in the year 1519, established at Joachimsthal a process of wet stamping and sifting. Whether the stamp mill was then practically used as we find it profusely illustrated in the work of Geo. Agricola, some years later, or whether it had been further developed by other hands in the interim, we are not informed. But for more than 300 years the stamp continued to be a square timber (except in a few instances, where square iron was used) with an iron shoe at the lower end. In this form it came to crush the first gold ore of California.

After outlining the development of the stamp mill in California, the paper says that sixteen years ago the writer became an advocate of concrete foundations and low-set guides for stamps, and three years later took the opportunity to apply these principles to the original Hacienda de San Francisco of Pachuca.

This first foundation, however, was not an unqualified success, the concrete having been insufficiently rammed; but it was a guiding star for the erection of the new Hacienda de San Francisco, built at Zotol. This mill began crushing ore in May, 1894, has been in practically constant operation ever since and has made a record in some respects very remarkable. It was built with twenty stamps, and in the following year was increased to thirty stamps. During these seven years only four stems, all told, have been broken and one renewed, and the stems are not seriously worn in the guides. The stamps, when new, weigh 1040 pounds each, and make 102 drops per minute. Each stamp has therefore dropped about 450,000,000 times, without renewal of stem or guide. For this result three causes are assigned:

1. The long stamp head and low guide prevent severe wrench to the stem when the stamp strikes hard at one edge of the shoe.
 2. The solidity of the concrete foundations keeps the jar and vibration of the iron work at a minimum.
 3. The iron guides give the stem but little play.
- At the Hacienda de San Francisco, now running, the concrete was laid upon solid bedrock, and was 9 feet in depth and 9 feet in width. It was very thoroughly rammed as laid. On a hard bedrock there is

no necessity for deep concrete, except to secure the required height—in fact, no foundation could be better than a solid, unfailing granite bedrock, with only a thin sheet of rubber or canvas between it and the mortar. With a mortar having a fairly thick bottom, this would make a perfect anvil for the blows of the stamps. The top of the stamp head in the San Francisco is only 2 inches below the lower guide when the stamp has new shoe and die, and is raised 6 inches for drop. This, of course, requires that the housing shall be around the stamp head instead of around the stem, which is easily effected with a long stamp head.

Guides of iron themselves wear so little and also wear the stem so much less than wooden guides that they are beyond comparison better. For example, how thick would a stem be, after running seven years in wooden guides, without repairs or alteration in length? The reason that wooden guides wear the stem so much faster than iron ones is that they accumulate grit, whereas an iron guide becomes smooth and polished.

A New Mineral.

The identification of a new mineral is reported by Dr. A. O. Ingalls of Alameda, Cal. He describes it as follows:

Provisional characteristics—Crystals, isometric (?), cubic, often tabular; granular; disseminated through the matrix.

Fracture—Uneven. Cleavage—Cubic, indistinct, brittle.

Color—Brass yellow, inclining to reddish yellow.

Streak—Blackish, iron black.

Luster—Metallic.

H=4. G=4.5 (?)

Open tube, faint sublimate TeO. Very rarely sulphur fumes.

Closed tube, faint sublimate TeO. Selenium, very rarely sulphur.

On coal—Fuses to semi-metallic globules selenium ring.

With potash cyanide, tin with spurting; with soda and borax, tin.

Soluble in NO₂ with decomposition and evolution, at first of NO₂, then selenium, forming a green solution.

Essentially Sn, and Se, or a selenide of tin. Some samples contain traces of copper, zinc and sulphur; but these are not to be considered essential, but accidental, as will be seen when its origin and association is considered.

This mineral may be considered as somewhat related to stannite, in which the sulphur is replaced by selenium and the copper and iron eliminated, the pure mineral being free from copper, iron, zinc or sulphur.

No quantitative ultimate analysis has been made.

Association—The mineral occurs in cubic crystals and granulations disseminated through a matrix of quartz and chlorite. Muscovite mica is usually present, with the chlorite often entirely replacing it, and from lithological characters the mica should be the association with quartz. This matrix also often carries an amorphous form of silicate of tin. This mineral is intimately associated with zinc, usually in the form of a silicate, often an oxide. No blende has been observed. A portion of this vein will consist entirely of the zinc.

This vein of mica-quartz schist, in which the mineral has been found, cuts a peculiar form of granite where, very often, the constituents are more or less completely separated, the hornblende in distinct crystals being at places the character, then the quartz will be entirely separated, and from these extremes the rock passes to a true granite. At places there is a true syenite, and in many places the serpentine series are lying against the granite.

The character of the mineral was examined in the field, and hence the characteristics are subject to correction.

The type is deposited in the cabinet of the State Mineralogist at San Francisco, Cal.

The scale of Baume's hydrometer or specific gravity measurer for fluids starts 10° lower than unity or water, thus:

| Degrees
Baume. | Specific Gravity. | Weight.
Gallon.
Pounds. |
|----------------------------------|-------------------|-------------------------------|
| 10 equals.....1 (water) weighing | | 8.33 |
| 20 "0.9333 | " | 7.78 |
| 30 "0.8750 | " | 7.29 |
| 40 "0.8235 | " | 6.86 |
| 50 "0.7777 | " | 6.48 |
| 100 "0.6086 | " | 5.22 |

THE most important quicksilver-producing districts in Mexico are Guadalcázar and Huitzuco, in the State of Guerrero. In the former locality it occurs in calcareous rocks of the Cretaceous age, where it forms veins and impregnations; the age of the formation and nature of the deposits being similar to those in California. In 1894 the Guadalcázar district produced about 25,000 flasks and Huitzuco about 5000 flasks—these two districts producing 260 of the 268 metric tons in Mexico in that year. The production for 1900 amounted to 335 metric tons.

A Standard Assay Certificate Form.

Written for the MINING AND SCIENTIFIC PRESS.

In the MINING AND SCIENTIFIC PRESS of September 14, 1901, suggestions were invited as to a proposed general blank certificate form for assay returns, that could receive such general acceptance that it could become a standard. The writer had long appreciated the deficiencies of the forms of assay return certificates employed. While satisfactory enough to the smelters and ore buyers, the assay return figures that they provided for could be misleading to prospectors, by reason of not stating the net commercial values. Used to formulate opinions or plan schemes of metallurgical treatment, engineers and experts would find it necessary to first make more or less computation to make the returns available. For example, one assayer would make a return on a sample reading as follows:

| | |
|----------------------|---------|
| Gold, .14 oz. | \$ 2.89 |
| Silver, 1.8 oz. | .97 |
| Copper, 4.8% | 15.96 |
| Total | \$19.82 |

Another assayer would make a return on the same ore reading as follows:

| | |
|----------------------|---------|
| Gold, .14 oz. | \$ 2.80 |
| Silver, 1.8 oz. | 1.08 |
| Copper, 4.8% | 10.68 |
| Total | \$14.56 |

Then it might be the prospector would conclude to have a mill test, as he would term it, made. A ton would be shipped to a smelter and the returns certificate that would be received would read something like the following:

| | |
|----------------------------------|---------|
| "Gold, .14 oz. | \$ 2.52 |
| Silver, 1.8 oz., less 1 oz. | .39 |
| Copper, 4.8%, less 1.3% | 7.78 |
| Total | \$10.69 |

LESS.

| | |
|-------------------------|----------------|
| Treatment charges | \$8.00 |
| Freight advanced | \$4.50—\$12.50 |

"The returns of your ore do not meet the freight charges advanced by us and our treatment charges. Please remit \$1.81 to balance."

All three of these returns show precisely the same quantities of the three metals in the ore. Each assayer, however, has had his own rule for determining and stating values. The first estimates gold at \$20.67 an ounce, its full mint value; silver at 54 cents an ounce, because silver was worth 54 cents an ounce on the day the assay was made, and copper at 16½ cents a pound, the selling price in New York. The second assayer estimates his gold at the smelter value of \$20 an ounce; silver at 60 cents an ounce, because his tables are prepared for that value, and copper at 11½ cents, being 5½ cents less than the New York quotation of 16½ cents, because the nearest custom smelter makes that deduction. The third—the smelter—values the gold at \$20 an ounce, but pays for only 90% of it; it values the silver at 64 cents, the New York market price the day of the assay, but deducts one ounce from the quantity and pays for 90% of what remains, and it values the copper at 16½ cents, the New York market price, deducting first from the quantity 1.3% to cover slag losses, and second 5½ cents a pound from the price, to cover the cost of refining, freight and marketing. Finally it charges up against the total values a deduction for treatment and freight advanced, thus making the settling value a negative quantity. Of the three, the first gave the theoretical values, which could be directly employed in devising the most economical treatment scheme for the ore. The third gives the immediately realizable commercial value. The second was a compromise, and really told nothing exactly, not even the gross commercial values that it pretended to. The engineer would have to compute from it the theoretical values for his starting point, and the prospector would have to compute it from the real commercial values so as to arrive at his finishing point without actually shipping to the smelter.

There is no reason why assay returns should be fictions. There are very many good reasons why the assay return certificates should directly state the facts of value that it was the object of the assay to determine. All the facts are better than part of them. The work of their ascertainment is purely mechanical. They can be obtained by the use of simple arithmetic. The assayer is very properly the person to estimate both the precise theoretical and commercially realizable values of the ore he assays.

The form the writer submits has been prepared by him to satisfy the requirements both of the metallurgist and engineer, and of the miner. In arranging it one of the ideas given consideration was to have it occupy such a space that it could be printed on the same size legal cap sheet employed for typewriting mining reports. The size is that of the blank form accompanying this. It can be bound in with the text of a mining report, either by the top or the left hand edge of the sheet. Each line of the form has a number by which reference from the text is simplified. It is suggested that the form be printed in copying

*Paper read before the American Institute of Mining Engineers, Mexican Meeting, by M. P. Boss.

| | | | | |
|----|------------------------------------------------------------------------------------------------------|---------------------|-------------------------------|--------------------------------------------------------|
| 1 | NAME OF MINE. | POST OFFICE. | COUNTY. | STATE. |
| 2 | GENERAL DESCRIPTION OF ORE REDUCTION, OR SCHEME OF TREATMENT FOR WHICH THE ASSAY VALUES ARE FIGURED. | | | |
| | Stamp Milling, | Amalgamation, | Concentration, | Cyanide, Smelting, Pyritic Smelting, Chemical Process, |
| | Custom Stamp Mill, | Custom Smelter, | Custom Pyritic Smelter. | |
| 3 | PHYSICAL DESCRIPTION OF MATERIAL ASSAYED: | | | |
| 4 | GOLD. | Ounces Per Ton. | Mint Value at \$20 67 Per Oz. | Sold at
Oz. Paid For. Per. Oz., \$20.00 |
| | Free..... | | | |
| | Total..... | 3.57 | \$73.79 | 3.39 \$67.80 |
| | Tailings..... | | | |
| 5 | SILVER | Ounces Per Ton. | N. Y., Per Oz, 54c. | Per Oz., 54c. |
| | Free..... | | | |
| | Total..... | 75.0 | \$40.50 | 70.25 \$37.93 |
| | Tailings..... | | | |
| 6 | COPPER | Lbs. Per Ton. | N. Y., Per Lb., 16½c. | Lbs. Paid For. Per Lb. ....10 25c |
| | | 352 | \$58.52 | 326 \$33.39 |
| 7 | LEAD. | Lbs. Per Ton. | N. Y., Per Lb., 4½c. | Per Lb.....c |
| | | 190 | \$8.31 | |
| 8 | ZINC. | Lbs. Per Ton. | N. Y., Per Lb., —c. | Per Lb.....c |
| | | | | |
| 9 | IRON. | Per Cent. | | Per Unit.....c |
| | | 16 | | |
| 10 | SILICA. | Per Cent. | | Per Unit.....c |
| | | 22 | | |
| 11 | | | | |
| 12 | | | | |
| 13 | TOTALS..... | | Gross Value. \$181.12 | Net Value. \$139.12 |
| 14 | DEDUCTIONS AND CHARGES. | | | |
| 15 | Zinc..... | Quantities Charged. | Charge. | |
| 16 | Silica..... | 5% | \$ 0.50 | |
| 17 | | | | |
| 18 | Treat'nt Per Ton..... | | \$ 6.00 | |
| 19 | Freight..... | | \$ 14.62 | |
| 20 | Total Deduction..... | | \$ 21.12 | \$ 21 12 |
| 21 | Net Value..... | | | \$ 118.00 |
| 22 | ASSAY MADE AT REQUEST OF..... | | | |
| 23 | DATE OF ASSAY..... | | | |
| 24 | ASSAY NO..... | | | [SEAL.] |
| 25 | CHARGES....\$6.00. | | | Assayer. |

DEDUCTIONS.
Zinc, 2% @ .50.....\$1.00
Silica, 12% @ .10.....1.20
Treatment charges.....5.50
Freight (on 440 lbs. lead to St. Louis).....2.20
Freight charges advanced.....6.70—\$16.60
Net payable to seller.....\$ 5.65

Here the work of the expert mining engineer would begin. The miner would hardly feel that he had much in ore for which he could get only \$5.65 a ton. The engineering problem would be to devise the scheme of treatment of the ore that would increase the net of \$5.65. The assay certificate would show on its face that there was a margin of \$36.61 a ton from which to make this increase.

A great number of assays are made for gold and silver only. For these, only No. 4 and No. 5 of the blank would be used. If an amalgamation assay be made to ascertain the recovery of free metal, the quantities and values would appear on the subdivision lines marked "Free." If in addition cyanide recovery was determined, there would be quantities and values written on the subdivision lines "Free," which would give the value recovery by amalgamation; "Tailings," which would state the value recovery by the cyanide treatment, and "Total," which would give the gross metal content and value, including both the others and the loss in the final tailings. Only the quantities and values on the lines marked "Free" and "Tailings" would be carried forward into the columns giving the commercial values. Only the value on the line marked total would be carried down in that column to the total.

The form, besides being convenient and desirable for recording the returns of assays in a uniform manner, would seem to be specially adapted to the service of mining engineers and metallurgists in considering the assay returns and constructing schemes of treatment based on them. Taking, for example, the hypothetical assay returns discussed above in the text where the determined quantities and gross estimate of market values is \$42.26 a ton, and the realizable sale value as ore \$5.65 a ton, an inspection of the assay return sheet giving the figures is at once suggestive of a concentration which would raise the ratio of the gold content in the concentrates, bringing it over .1 oz., which would be paid for by custom smelters, and reducing the zinc below 10% and the silica per cent equal to or below the iron, thus saving the penalizing for the excess quantities of these minerals. While absolute knowledge of how a particular ore will concentrate is only to be obtained by doing it, approximate knowledge is now sufficiently available to make a probable hypothesis. The estimates of this hypothesis can be written in the columns provided for the commercial figures and its net result obtained with a minimum of distinctive or recording labor. There would also be suggested a scheme based on the separation of the lead and zinc sulphides. With the lead the zinc is not paid for by custom smelters. Separate, it has a realizable commercial value. It is hardly necessary to go into detail in this direction. The applicability of the blanks in facilitating such estimations will readily suggest itself.

In submitting the form the writer's idea is that it is rather suggestive than conclusive. There will probably be suggested changes, or even a complete remodeling, that will more perfectly meet the desired end. This end may be defined as a standardizing of the rule for the estimation of values of metals by assayers and a standard form of recording the estimations, which, combined, will be essentially labor-saving over the existing practice. R. L. D.

Gold Dredging Work.

Regarding the capabilities of a 3-foot Risdon gold dredger, referred to in an article on gold dredging in the issue of the 16th ult., the superintendent of the Kia Ora, a 3-foot Risdon dredger at Oroville, Cal., furnishes the following, which is self-explanatory and makes an excellent showing:

ANNUAL STATEMENT OF WORK DONE BY THE KIA ORA GOLD DREDGER FROM WEEK ENDING OCTOBER 6, 1900, TO WEEK ENDING OCTOBER 5, 1901.

Total working hrs. in above period..7460
Less hrs. lost through want of power. 311

Total possible hrs. dredging....7149 equiv. to 100%
Actual hrs. dredging...5148 equiv. to 72.0% total time
Loss of time—
Stoppage for repairs....1268 equiv. to 17.8% total time
Stoppage for cleaning up, oiling, changing lines, and sundries..... 733 equiv. to 10.2% total time

Totals.....7149 equiv. to 100.0% total time
Total bank yards lifted = 283,750, equivalent to 376,000 bucket measure.
Theoretical capacity of dredger, 101 cubic yards per hour.
Actual capacity reached = 53% of total hours.
Actual capacity reached = 73% of actual hours.
Average cubic yards bank measure lifted per working day = 1320.
Average cubic yards bank measure lifted per possible working day = 950.

ink, so that the assayer can take a press copy of it in full. The assayer can have his business card printed on the blank at the bottom or on the reverse side of the sheet where the back folded would come.

Referring to No. 2 on the form, the scheme of treatment of the ore for which the assay values are estimated commercially, the assayer would cross out with his pen all but the particular one selected. In No. 3 the assayer would write the physical description of the ore sample, whether crude ore, mill pulp, concentrates, tailings, etc. In No. 4 and No. 5 provision is made for free milling and tailing assay values, as well as the usual gross assay value. Under No. 4 a blank is left in which the assayer would write the particular custom works estimated on as the market for the ore. The object of this is to give a concrete basis from which to make commercial comparison.

On the form accompanying this are the assay returns of a sulphide ore illustrative of the practical use of the form. It will be noted that gross values and quantities are given separate from the commercial values that are directly realizable by sale of the ore. The difference between the two shows up directly on the face of the sheet.

Take another example of a sulphide ore, the metal

quantities of which would be returned: gold .09 oz., silver 16 ozs., lead 24.5% [490 lbs.], zinc 12% [240 lbs.], iron 12% and silica 24%. On the form would be recorded gross values as follows:

Gold (total) .09 oz., mint value.....\$ 1.86
Silver (total) 16 ozs., New York value.. 8.64
Lead, 490 lbs., New York value..... 21.44
Zinc, 240 lbs., New York value..... 10.32
Total.....\$42 26

The commercial value as ore would, of course, depend on the particular custom smelter considered as buying it. Each local plant is, in the prices it is willing to pay, determined by its special local conditions. For the purpose of this discussion, assuming the rates and conditions of a custom smelter with which the writer is acquainted, the commercial values recorded on the face of the sheet would read something like the following:

Gold (no value, the quantity being less than .1 oz.).....\$.....
Silver, 13.5 ozs. @ 54c..... 7.29
Lead, 440 lbs. @ 3.40..... 14.96
Zinc (no value).....
Total.....\$22 25

Late Gold Dredging Practice.*

NUMBER VII.—CONCLUDED.

Written for the MINING AND SCIENTIFIC PRESS
by RALPH L. MONTAGU.

CONCLUDING REMARKS.—After having read the description of the various types of dredger, the reader will in all probability ask which is the best dredger? The question is best answered by another, viz.: What is the nature of the ground you propose to work with a dredger? As I have already pointed out, one type of dredger that may be successful in a certain case might be absolutely useless when tried under different conditions. In a number of cases a fair degree of success may be attained with one of the standard type of dredgers, but in the majority of dredging propositions some special design and, if necessary, new ideas can be introduced into the existing types that thereby increase the efficiency and capacity of the dredger. Where conditions confront the engineer which demand a radical departure from any of the standard types unless the engineer has had considerable practical experience in dredging his design is likely to be largely in the nature of an experiment. For every case there is some particular form and combination of machinery that will produce the best results, other types may be a financial success but not so much so as the former.

The engineer should satisfy himself before any construction work is commenced that he has selected the most efficient machinery for the case he is considering.

Intelligent management is a factor of considerable importance, as it is in most businesses, and like many other mining ventures a number of dredging investments have been unprofitable from this one cause alone. Mining engineers who have been eminently successful in other branches of mining have been known to make most lamentable failures when they have attempted dredging, not because the investment would not have proved remunerative if properly handled, but because they had no previous experience in dredging to guide their efforts.

An efficient dredger, properly managed, should actually be digging at least twenty-two hours out of every twenty-four. To those whom knowledge of dredging is merely superficial this may seem practically impossible; but these results have been accomplished in localities where the conditions were the reverse of simple.

If those who are interested in a dredging investment do not obtain these results, they can satisfy themselves that either the best form of dredger for the work has not been installed or that the management is at fault.

The following points, together with what has already been written on the subject, will, I hope, be of some practical value to those who have had no previous experience in dredging, but are desirous of operating a dredger successfully.

The operating expenses of a dredger can be cut down by substituting electric power for steam (without taking into consideration the difference in cost of fuel and electric power, which is in favor of the latter), because a dredger operated by electricity will take from one to three men per shift less than a dredger driven by steam of the same size.

Where it is proposed to operate a number of dredgers and there is no available water power anywhere near, a saving can be accomplished in the fuel consumed by generating electric power at a central station and transmitting it to the different dredgers. The central station can be advantageously located at a distance from the dredgers, as in some localities, owing to the nature of the roads, the cost of hauling the fuel adds considerably to its price delivered at the dredgers.

Wherever electric power can be used profitably it should be done, but under certain conditions, such as cheap fuel, and a relatively small area to be mined, it might be cheaper to use steam.

The parts of a dredger that wear out quickest are all those which are brought in contact with the gravel, such as the bucket chain, shaking screens or revolving grizzlies, sand or gravel pumps, stackers, belt conveyors and the riffles in the sluice box or on the tables.

If the pins that connect the buckets and links are made in such a manner that it is impossible for them (the pins) to revolve, they last considerably longer than pins that are allowed to revolve.

Some shops turn out a bucket chain, the joints of which are protected by moulded rubber bushings. This prevents the entrance of grit or sand into the joints and naturally prolongs the life of the pin. In order not to lose more time than is absolutely necessary it is advisable always to have on hand spare parts to replace the parts that wear, such as extra buckets and lips of the same, pins to connect them, plates for screens and grizzlies, liners for sand and gravel pumps, etc., because when any part breaks through being weakened by wear, it is frequently impossible to get the necessary piece to replace it without a delay of some days, during which time the dredger is idle. In localities where the season, ow-

ing to the severity of the winter months, is short these delays mean a considerable reduction in the annual profits.

In regard to cleaning up it is advisable to find out the percentages of the total cleanup recorded in the various tables, sections of sluice box, etc., and to make any changes that experience will dictate, in order to increase the efficiency of the process.

Better results are obtained when there are three shifts of winchmen or operators per day than where only two shifts are employed in the same time.

Whether the buckets are coming up full or not, etc., depends on the attention the operator gives to his work, and eight hours is the limit during which an operator can do justice to himself on the machine he is handling.

In starting a new dredger the cost of repairs and the lost time will not be so large and consequently the returns will be more gratifying if experienced men are employed in any capacity where experience is needed.

It may seem the words just written are unnecessary, but I have seen a number of new dredgers started into operation with a large majority of their crew totally inexperienced in the work they had to do. A supposed saving was effected in some cases because the wages accepted by these men were less than those demanded by experienced workmen, but the frequent and unnecessary stoppages of the dredger, and the amount of machinery broken while the men were becoming acquainted with their work, more than balanced the small amount saved by paying smaller wages.

In starting a new dredger there is considerable difficulty experienced in finding out where to dispose of the tailings, because the dredger starts at the top of the ground and there is no cut already excavated in which to dump the tailings; this fact alone is sufficient for the patience of most managers without adding to it by having inexperienced men to do the work.

Every unnecessary stoppage of the dredger represents a corresponding reduction in the profits derived from the investment and that there is a want of efficiency somewhere. There are, of course, numerous times where a shut-down is unavoidable, but there have been cases that are well known in their respective localities where with the best machinery obtainable the management has been such that the dredger has been shut down and lost weeks in place of days, and days instead of hours, as would have been the case if any ordinary intelligence had been exercised in the management of the plant.

Dredging, although a modern process of placer mining in the United States, has already attained considerable magnitude. The various systems of dredging have been described without prejudice to any particular type of dredger, the advantages and their respective adaptability to different conditions have been enlarged on, and it devolves now on the engineer to choose, with the help of these pages, from the many the one type that will accomplish most successfully and efficiently the work to be done.

Gold Road and Boundary Cone, Ariz.

[STAFF CORRESPONDENCE.]

This district is in the River range, in Mohave county, from 12 to 15 miles east of the Colorado river. It is about 27 miles southwest of Kingman and 20 miles northeast from Needles, Cal. The camp is reached by good wagon roads from both points. The trip from Needles requires ferrying across the Colorado river. Kingman people call it the Gold Road district, because the Gold Road mine, located by Kingman parties, is the initial point reached from Kingman. Needles people designate it as the Boundary Cone camp, that being the name of a prominent peak in the western portion of the district. This peak is a landmark for surveyors, as it marks the location of the thirty-fifth parallel. The camp extends along the western slope of the range, covering an area about 4 by 7 miles. The general trend of this range is northerly and southerly, though it is so broken as to partially destroy the form of a continuous chain. The formation is porphyritic, with outcroppings of ledge matter both crosscutting and running longitudinally with the stratification. Thus there are veins running north and south and others east and west. The vein matter may be characterized as a quartz and spar, carrying streaks of brown hematite, all three of these materials bearing free gold. It is also quite apparent that much of the partially decomposed porphyry is slightly impregnated with gold. In the white quartz and spar the gold particles are the finer, the coarser particles, flakes and small nuggets being usually within the iron seams. Ores that will horn out free gold are readily found; and this seems to apply to those coming from considerable depth as well as near the surface. It is believed the usual method of amalgamation, with cyanide treatment for the tailings, would thoroughly save the values. In looking over the district generally one observes numerous veins exposed whose surface showings are excellent, so far as width and character of ore are concerned.

The Gold Road mine, whose vein crosscuts the for-

mation, is in the eastern portion of the district, well up toward the top of the range. This property belongs to O. P. Posey, William Bailey, Clarence McCornick, George Kisingbury and others of Salt Lake City, Utah, the last named being general manager. Development consists of a 185-foot shaft, with a considerable amount of drifting in the ore. At 160 feet depth a flow of water was struck, which increased with depth to such an extent as to stop work in the bottom of the shaft till pumps could be put in. A 44 H. P. gasoline-operated air compressor is used for drill work and a 12 H. P. gasoline hoist is in use. Supt. E. W. Mellarky states that the mine produces about 14,000 gallons of water per day. He also states that development discloses about 50,000 tons of ore in sight.

The Lohengrin and Hilty ledges, practically paralleling the Gold Road, show also the characteristics above noted, but are developed but little.

In the western portion of the district, around Snowball camp, are the Treadwell, having a 180-foot shaft, the Snowball, with a 100-foot shaft, and the Dewey—all the property of the Snowball M. Co. These locations cover two ledges, which intersect each other. Work on the Treadwell shows a width of 40 feet between the walls. This group is under the management of O. F. Kuencer of Kingman. A supply of water was struck in the Snowball at 55 feet depth, and on the Dewey at a depth of 10 feet.

Carl Tanner and Sam Klopfenstein have a number of claims in this locality, whereon they have some development, the ores from which they have carefully sampled and assayed, returns running from \$36 to \$340 per ton.

The most remarkable showing of free gold in the district is to be seen on an east and west ledge, covered by the Indian claims, now belonging to Thomas Ewing. The gold here is seen in the quartz, spar and hematite, much of it being in flakes and small shots.

The Leland group of eight claims, covering one main ledge and several lesser ones, all trending north and south, is developed by two tunnels, both on the vein. The lower tunnel has been driven 380 feet, the upper 150 feet. This work shows the width to be 10 to 30 feet between walls, and that the high values are usually next to the hanging wall, but that the entire width will average well. The lower tunnel gives a depth of 500 feet below the surface. The plan is to drive a third tunnel at a point 200 feet lower. It is said electric power may be generated at the river and transmitted to this mine. The Leland group was located by Lane & Spear, who sold it to S. A. Bedell, the latter bonding it to Thomas Ewing of Los Angeles, Cal., who represents a syndicate of New Yorkers. It is said the money is at command to erect a mill as soon as the mine is sufficiently developed.

Developments in this district are not sufficiently advanced to enable one to make a general estimate of values, though it would appear that \$15, \$20 and \$30 per ton are approximate averages of the ores sampled.

The Rattan mine, northwesterly from the Gold Road, belongs to St. Louis parties and has a small stamp mill operating on free milling ore.

On Silver creek is the Mascot mine, belonging to Hawkins & Miller, and the Columbia, to P. H. Collins, who is developing the property.

Kemper Bros. of Kingman sold the Gold Road Extension to George N. Hooper of Los Angeles, Cal., for \$35,000. It is also reported that Mr. Hooper bought other claims covering portions of the same ledge. It is also stated that the three claims of the Hilty group have been bonded to Thomas Ewing, the amount named in the bond being \$75,000.

Kingman, Nov. 30.

Earth Temperatures in Mines.

In general, but not always, the highest temperatures are found at the greatest depths. Temperatures taken at different parts of the same stratum at the same level sometimes differ 5° C. The air temperature at any level is usually lower than the rock temperature, the difference being occasionally 10° or 11°. Sometimes the air temperature has been found to be 5° higher than the corresponding rock temperature. The highest temperature observed was 39° C. at 677 meters; but this may have been due to local causes. The highest air temperature was 34½° at 776 meters. The layer having an invariable temperature of 9° C. was situated at 25 meters below the surface. Determination of the depth corresponding to an increase of temperature of 1° C. varied considerably. At points of depth below 100 meters this depth varied from 13 to 25 meters; at 200 meters, from 12 to 31 meters; at 300 meters, from 19 to 40 meters; at 400 meters, from 18 to 40 meters; at 500 meters, from 20 to 37 meters; at 600 meters, from 22 to 35 meters; at 700 meters, from 21 to 36 meters; at 800 meters, from 27 to 30 meters.

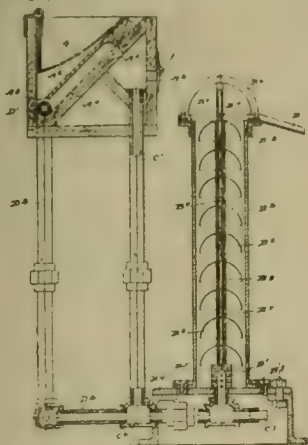
If averages are taken, this depth is found to be for each 100 meters: Less than 100, 22 meters; than 200, 23 meters; than 300, 28 meters; than 400, 27 meters; than 500, 28 meters; than 600, 28 meters; than 700, 28 meters. In a general way it may be said that each increase of depth of 28 meters corresponds to an increase of 1° in temperature.

Mining and Metallurgical Patents.

Patents Issued December 3, 1901.

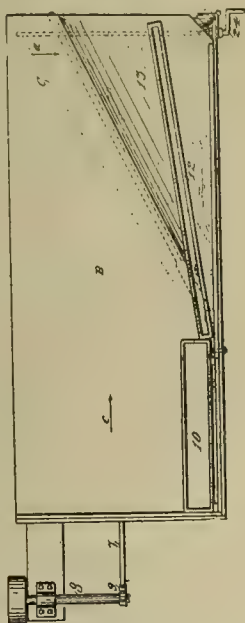
Specially Prepared for the MINING AND SCIENTIFIC PRESS.

GOLD SAVER.—No. 687,875; M. Flatland and B. Lister, Vallejo, Cal.



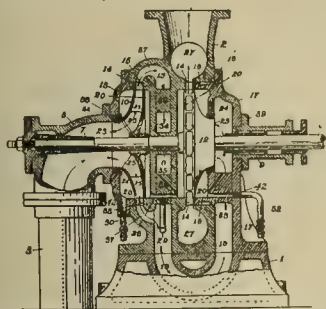
A hopper having a screen member, an inclined surface below screen; an incline parallel with before-mentioned incline, leaving a space between connecting with chamber below inclines; an outlet from chamber emptying into bottom of an amalgamating pile consisting of a series of hemispherical plates mounted upon a central shaft and surrounded by a cylindrical shell open at top, and having an inlet at bottom connected with hopper; means for agitating pulp passing from hopper to amalgamating pile.

CONCENTRATOR.—687,908; S. W. Traylor, Denver, Colo.



A table having a yielding supported inclined surface located at one corner of tail thereof, and sloping downwardly to concentrating surface of table, springs connected with inclined surface underneath, and a bar slidingly connected with springs, bar being pivoted at one extremity and arranged to swing below and in a plane parallel with concentrating surface of table, whereby as bar is moved area of inclined surface may be regulated at will, and greater or less portion of inclined surface made to coincide with plane of concentrating surface of table.

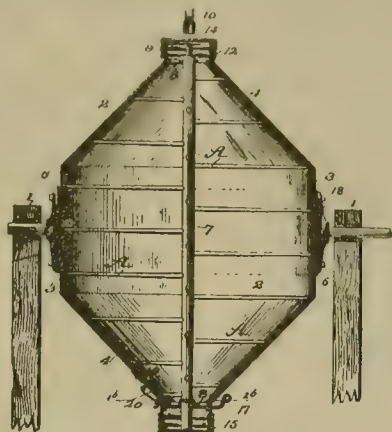
COMPOUND ROTARY PUMP.—No. 687,853; J. Richards, San Francisco, Cal.



A casing containing two interior chambers bounded peripherally by curved walls, a driving shaft passing through both chambers in the line of the axes of their peripheral walls, an imperforate disk partition in first chamber dividing it into two waterways in communication by means of an annular peripheral passage formed between disk edges and curved wall of

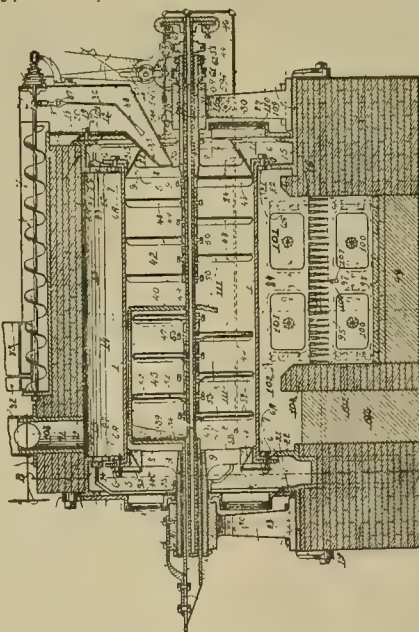
chamber, an impeller on driving shaft in first waterway of chamber, a removable annular throat ring provided with inclined wedge-shaped partitions forming between them smooth straight passages approximating a tangential direction in line of motion of impeller, interposed between impeller at its periphery and entrance to annular periphery passage, impeller forming a running joint with entrances in throat rings, baffle plates in second waterway supporting disk partition, a curved dischargeway from second waterway to second chamber, an impeller on shaft in second chamber facing oppositely from first impeller, a removable annular throat ring with inclined wedge-shaped partitions surrounding second impeller, forming a running joint with periphery thereof, throat ring having inclined passages discharging into annular peripheral passage of second chamber, and an outlet from second chamber.

COMBINED CONCENTRATOR, AMALGAMATOR AND SEPARATOR.—No. 688,096; W. O. Journeay, Austin, Tex.



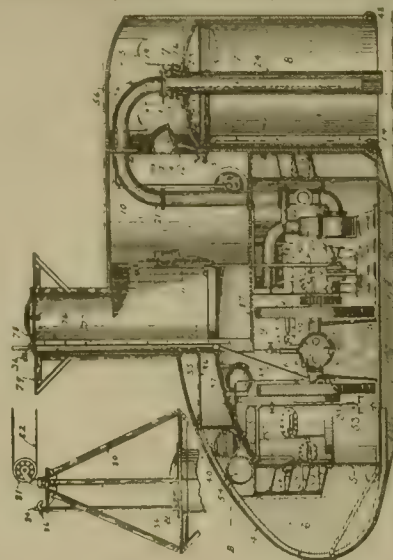
Receptacle having a cylindrical body and frusto-conical ends, each end having an opening, removable caps to close openings, a band surrounding body, journals fixed to band, means for turning receptacle on its journals, a stirring shaft with detachable fingers, or their equivalents, spider journals in each end of receptacle supporting stirring shaft, a damper cut-off in lower end of receptacle, an extension shaft with stirring devices, and a detachable cylindrical separator adapted to be secured to lower end of receptacle.

ORE TREATING FURNACE.—No. 687,713; H. S. Bailey, Denver, Colo.



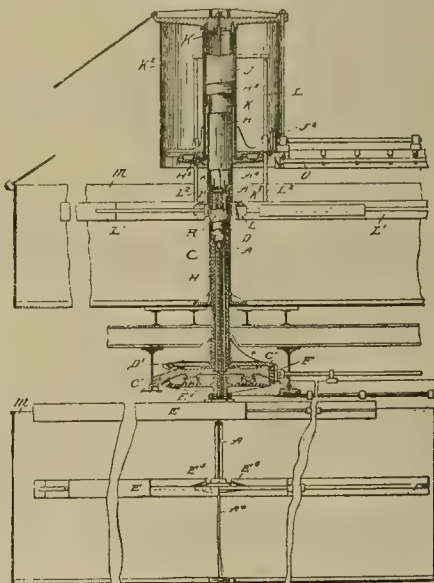
Brick side and roof walls, end piers, end rings and bed plate at the ends of walls, journal boxes and their stands mounted on bed plate and piers, an ore treating cylinder having open ends, means including an axial shaft in cylinder provided with blades for feeding and discharging ore into and from cylinder, trunnions secured to ends of cylinder by arms and journaled in boxes, means including a combustion chamber for heating cylinder, a hollow shaft journaled in trunnions and passing through cylinder, hollow, obliquely inclined arms mounted on shaft having perforations in their sides and ends, perforations through shaft registering with chamber of hollow arms, means including a blower for forcing air into cylinder through shaft and hollow arms, obliquely inclined arms comprising blades also mounted on hollow shaft, a partition supported by one trunnion extending into cylinder at its central portion and arranged to be moved axially and concentrically of cylinder and arranged to divide it into two independent compartments, and means including cones and gears for imparting different rotative speeds to cylinder and hollow arms in same or in different directions.

SUBMARINE DREDGER AND GOLD SAVING MACHINE.—No. 687,830; J. A. Kirk, San Francisco, Cal.



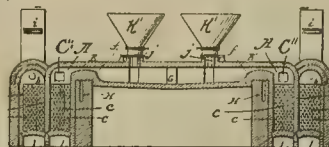
Shell or body of dredger, means for submerging dredger, means for excluding water therefrom when submerged, an excavator, a closed sluiceway, means for forcing excavated material and water under pressure along sluiceway, a spreader therein concaved downwardly and having a central V-shaped rib on its under side, the sluiceway having a narrow port or slit opposite to V-shaped rib, and means for discharging fluid under pressure through port.

APPARATUS FOR CHARGING OR DISCHARGING CYANIDE VATS, ETC.—No. 687,920; A. D. Jansen, Johannesburg, South African Republic.



A pair of tanks placed one above the other, a vertical rotary shaft A centrally of tanks, scraping arms carried thereby within lower tank, a threaded bearing block at upper end of shaft, in which block shaft is permitted to rotate while being held against longitudinal movement therethrough, an outer hollow shaft having interior screw threads engaging bearing block, means for operating shafts, a vertical tubular framework encircling upper portions of outer shaft and a tubular shaft K encircling framework and having threaded projections, a tubular shaft J' encircling shaft K, the projections carried by tube or shaft K having threads engaging corresponding threads in shaft J', means for rotating shaft J', a boss K' on shaft K within upper tank, a hub L rotatably mounted thereon carrying scraping arms, and means for rotating hub.

FURNACE FOR TREATING ORES.—No. 687,918; F. B. Durr, Tacoma, Wash.



A hearth of regenerators arranged at ends of hearth and extending below its plane, a support for solid fuel arranged at upper end of each regenerator and lying in same horizontal plane as hearth but exterior to and below top of bridge walls of latter, auxiliary regenerators arranged adjacent to regenerators, regenerators being provided at lower ends with communicating flues, the auxiliary regenerators being provided at upper ends with air inlets, stacks communicating with auxiliary regenerators, and cut-offs arranged in stacks.

MINING SUMMARY.

Specially compiled and reported for the
MINING AND SCIENTIFIC PRESS.

ALASKA.

JUNEAU.

The Alaska-Juneau G. M. Co. is preparing to run a tunnel 3000 feet long, 8 feet wide and 7 feet high through Juneau mountain, 1 mile below Juneau, commencing the work in the spring. Preliminary work in the way of surveying will be done this winter. The object of the tunnel is to crosscut the veins in Juneau mountain, and at the same time open up the company's properties in Silver Bow basin beyond. In the spring buildings will be constructed and compressed air drills placed in operation. The cost of boring the tunnel and opening the gold veins which it will pierce is estimated at \$1,000,000.

The Alaska Perseverance Co. has commenced a tunnel on the opposite side of Juneau mountain, but its tunnel is 1100 feet above the site selected by the Alaska-Juneau Co., which is only slightly above the sea level.

VALDEZ.

The Meenich Bladdaugh M. Co. of Elamar, Alaska, will ship by steamer 1000 tons of copper ore a month from the Elamar properties near Valdez. The first shipment of 1000 tons of ore is expected to arrive at Puget sound about December 10.

ARIZONA.

COCHISE COUNTY.

A strike of copper ore has been made on the claims owned by W. H. Brophy, R. S. Hunt, A. Sowles, J. Connelly and J. Bell, near Bisbee. The ore was uncovered only 4 feet from the surface while starting a shaft, and runs from 15% to 25% copper.

R. Toobey has sold four mining claims in the Harqua Hala district to S. A. Dorsey of New York.

The Huachuca Con. Co. of Bisbee has bought the Wickersham mines, located in the Huachuca mountains. The company now owns twenty-two claims.

GILA COUNTY.

A. C. Sieboth, who is developing the Welch copper claims near Globe for the Pinto Creek C. Co., says that the shaft at the depth of 146 feet is in high grade sulphide ore, an unexpected find, as the shaft was located on supposed barren ground between two ledges which outcrop some distance apart. The company is composed of Houghton county, Mich., people.

GRAHAM COUNTY.

At the Gold Mountain of the Galluros the ore shoot is said to be over 600 feet wide, and more than a thousand feet long exposed in the crosscut of the box canyon that cuts the vein at right angles, over 300 feet in depth. Thirty miners have been making a cut across the vein in the canyon, which for the 400 feet already cut is all in ore. Samples taken from all of the workings and exposed parts of the vein to get an average gave an assay return of \$5.60 in gold.

MARICOPA COUNTY.

G. E. Sanders, who recently sold his claims near Wickenburg to the Idaho Con. C. M. Co., is to start development work for the company on an extensive scale. The group consists of a mineralized dike in which there are two pay streaks of high-grade ore, one from 6 to 12 inches in width, the other 3 to 5 feet, on which about 300 feet of development work has been done.

PINAL COUNTY.

The Casa Grande C. & G. M. Co., the owners of the Jack Rabbit mine, near Casa Grande, it is reported, propose to treat the ore by the hyposulphite lixiviation process. The values are gold and silver, the latter in the form of chloride.

YAVAPAI COUNTY.

(Special Correspondence).—The most important operations on Lynx creek are by the Penn M. Co., on the south side of the creek, and the Dartmouth M. Co., on the north side. The latter have a group of eight claims, on which they have a bond from J. Breslin and B. W. Traylor. The active men in the Dartmouth Co. are M. S. Taft, V. R. Salinger and E. S. Feinerman, who are Eastern people. Within the last three months a steam hoist and shaft-house have been provided and a shaft sunk 100 feet, from which 10,000 gallons of water per twenty-four hours are lifted with a sinking pump. In doing this work 200 tons of fair grade mill ore have been taken out. The vein is a contact between granite and syenite, the gangue being quartz and a partially decomposed porphyry. The vein dips eastward. The values are silver, gold and lead. A drift has been started from the

shaft. The work is in charge of J. Breslin, who states that the erection of a concentrating mill is contemplated.

The Penn M. Co., W. L. Bell Supt., have a well-developed mine and a successful mill. The original shaft is down 517 feet, on the dip of the vein. A description of the underground workings was given in the issue of March 16, 1901. Since that date a new shaft has been sunk on the same ledge 700 feet north of the old one. At present 200 feet depth has been reached, but it will be continued to the 500-foot level. This new shaft, which sinks on an incline in the hanging wall, is well timbered, having a compartment for the skip and another for the manway. At the different stations crosscuts will be run to the ledge and connection made with the old workings to the south. It is said the ore on the 500 level is of even better grade than that from higher levels. At the new shaft-house is a steam hoist and dynamo for light. An air compressor for drill work is also to be put in.

The mill treats eighty-five tons of ore daily, the equipment being crushers, three Huntington mills, Bartlett and Wilfley tables. The ores comprise an iron, lead, zinc and copper sulphide. The middlings are cut out from the tables and run separately. They carry about 20% to 27% zinc, with considerable gold, the product being sacked and shipped to the zinc smelter at Canyon City, Colo. Most of the silver is saved with the lead and iron concentrate. It is stated that the average saving last month reached 87%, and that not over 40 cents in gold to the ton of ore is lost in the tailings.

The Accidental mine, partially developed, has been sold to the Poland M. Co., whose holdings extend from Big Bug gulch across the mountain to Lynx creek. Walker, Dec. 5.

(Special Correspondence).—The Bunker Hill, near Chaparral, is being developed and has a 350-foot tunnel on the vein, and a 140-foot shaft at a point on the same vein, with 120 feet of drifting from the shaft. It is claimed they have a 20-foot ledge, with an 18-inch pay streak. The ore is gold-bearing quartz, carrying some copper.

Chaparral, Dec. 9.
(Special Correspondence).—The Prosperity M. Co. have a group of four mining claims in Copper Basin district, 12 miles west of Prescott, on the Skull valley side of the range. Considerable development has been done, disclosing a ledge of silver-lead-copper ore, assays of which showed an average of about eighteen ounces silver, 44% lead and 4% copper. This and other properties under development, controlled by Douglas, Lacey & Co. of New York, are managed by L. D. Phillips of Prescott.

Prescott, Dec. 9.
At the Congress mine, at Congress, Mr. Staunton manager, the old mill has been taken out and is being replaced by a new 80-stamp mill, which will go into service about Jan. 1. The ore crushed will be doubled; thirty to thirty-five tons daily increase in the concentrates will be made. The workings are now down 3150 feet in one shaft, 1700 and 600 feet in others. The ledges have widened and the lower levels are estimated to have enough ore in sight to run the mill for several years.

F. Kuhne and G. C. Waddell have made a shipment of ore from their Quartz mountain group of mines, near Prescott, which sampled \$80 per ton gold.

The Union mine, formerly owned by Luke Bros., has been sold to Michigan people, represented by W. J. Rainey of Detroit. The ore is silver-bearing galena, carrying gold and copper in quartz gangue.

CALIFORNIA.

AMADOR COUNTY.

(Special Correspondence).—Defender Mine: A 6-inch Cornish pump has been installed and works satisfactorily. The mine has been unwatered to the 300 level and sinking resumed. This property has outgrown its power plant, sinking being done on day shift and the mill being run at night. As soon as the owners have decided on a system, the entire plant will be taken out and the mine fitted with adequate machinery.

Belmont Mine: John McKelvey is operating this mine, which is a continuation of the Defender ledge. The shaft is now nearly 150 feet deep in high-grade ore. Baby machine drills are in use, run by steam.

Mitchel Mine: Ten stamps are kept running to their full capacity. The management contemplated another ten stamps, but the construction will be deferred until spring.

Tuscano Mine: The Amador-Phoenix Co. are opening up this mine. The new shaft is down 140 feet and equipped with a Ledgerwood double engine. The 100-foot station is being cut and, when finished, sinking will be resumed. The construction of the mill is finished, and, as soon as the

tramway from the shaft to the mill is connected, milling will commence.

Standard Electric Co: The connection has been made in the long tunnel between the Tabeaud reservoir and the river side. The Page dam is also completed, and the only thing necessary to put the electric plant in motion is the completion of the pipe lines from the top of the river bank to Page's dam. The company expect to be running in two months. They have 5000 inches of water and a head of about 1500 feet.

Clinton, Dec. 5.

J. Gardella of the Big Bar bridge has made a test crushing of ore from his quartz mine at the Light House mill for parties looking at the mine with a view of buying.

A trial run has been made of the cement gravel in the new roller mill at Upper Rancheria. The company, New York people, has spent a large sum in preparing for the operation of the property. The milling capacity is 150 tons per day.

Work is in progress preparing for gravel mining on the Finch ranch, near Forest Home, which has been leased by Miller & Co. from E. Ekels. Twenty men are at work grading, and putting up a mill. The ground has been worked over before, but it is believed that it will pay to rework with better appliances. The company intends to operate the mills with oil as fuel.

The Cranmer Bros. have started up a 2-stamp mill at their quartz mine on Elsie creek, near Drytown. The stamps weigh 1000 pounds each and are run by an overshot wheel.

G. A. Gritton, on his gravel claim at Volcano, has commenced work.

A concrete foundation has been put under the engine used for hoisting at the main shaft at the Keystone mine, Amador City, and a new gallow frame erected. The addition to the mill is all ready for the machinery.

CALAVERAS COUNTY.

The entire group of mines, including the Stickle, Madison, Cross and Utica, started up on the 5th inst., after being closed for a month while repairs were being made on the water system and machinery. About 600 men have gone to work for the winter.

It is reported that an exceptionally rich strike has been made in the Gold Hill mine near Angels Camp. A large vein of ore running \$48 to the ton has been uncovered, and it is reported that the mine has been shut down until machinery can be put in.

Work is progressing rapidly at the Melones. The flume is completed except half of a mile still under construction. A large wooden pipe has been laid across Coyote creek, connecting the flume with the water tunnel.

The Royal M. Co. at Hodson will put in machinery to use oil as fuel at the mill.

EL DORADO COUNTY.

The Blackjack mine at Centerville has closed down for the winter.

At the Gold Bug mine, near Georgetown, Supt. Thorne says the pipe line for the new hydraulic elevator is completed and the elevator set up ready for operation.

F. S. Chadbourne, manager of the California Slate Co. at Placerville, has men at work and is getting everything ready at the quarry to resume manufacturing and shipping roofing slate. Work will be started with the machinery already on the ground, but it is the intention of the company to install heavier machinery in the spring.

MONO COUNTY.

The 3-stamp mill at the Golden Gate mine, near Bridgeport, has been started up, with fifty tons of ore in the ore bin at mill and an abundance of ore in sight at open cut being mined. E. F. Donivan is manager.

A Philadelphia company is having development work done on the Belle mine, near Benton, with a view to investment. The ore is to be worked for gold and silver. The deposit is low in grade but very large in amount. W. C. Pidge is Supt.

NEVADA COUNTY.

At the 16 to 1 quartz mine at Washington, owned by Dillon & Son, development work is being done. The mine is a large low-grade proposition, the ledge being from 20 to 40 feet wide and yielding in the mill on the mine from \$3 to \$6 a ton. The average cost of mining and milling, using water power, is 75 cents a ton. Some runs have been made at as low a figure as 45 cents a ton.

At the Eclipse mine at Gold Flat, near Nevada City, B. Hoskins Supt., the new hoisting machinery is in place and started up. The incline is now down about 100 feet and follows the ledge from the surface. The vein is about 8 inches in width. The water level has not yet been reached, but pumping machinery is in readiness for it.

SACRAMENTO COUNTY.

D. Cameron, manager of the Ashburton M. Co., an Eastern company, reports that last week's clean-up of the dredger working near Folsom netted \$6000 in gold dust. He said this figure represented the average weekly earnings for some time past.

SAN DIEGO COUNTY.

F. Guerra, manager of the California King G. M. Co., is to open up the company's claims at Picacho without delay. A large number of men are at work.

SISKIYOU COUNTY.

The Deadwood M. Co. has been incorporated, with L. F. Montague, C. Paige, A. R. Vining, J. W. Pews and F. W. Mahler of San Francisco as directors. N. Graves has a contract for putting up hydraulic plant at the company's mine on Deadwood creek, near Yreka.

The John Quincy placer mine at Oro Fino has started up. The McKeene mine has been started up after an overhauling of the cyanide plant. Another 40-ton vat has been added.

Work has been commenced at the Red Bird quartz mine, near Yreka, and a shaft 200 feet deep will be put down. The mill is ready for crushing.

TUOLUMNE COUNTY.

The Stockton Gravel M. Co. has started up their gravel properties, known as the Philadelphia Diggings, at Columbia. W. Tucker is Supt.

The Contention mine, on Knight's creek, above Columbia, is said to be yielding ore of splendid value. The vein varies between walls of granite from 10 to 18 inches in width and mills about \$25 per ton. The present workings consist of a 200-foot tunnel and upraise to surface. The Tibbit 5-stamp mill has been removed from Eagle creek and set up on the Contention.

The Bourbon mine, near Columbia, has been bonded to Colorado people by P. Copella & Co. A shaft 80 feet in depth comprises the development work which exposes a fine ledge.

At the Harvard mine, near Jamestown, it is reported that work will soon be commenced on extensive improvements. A new hoist, boilers, engine, etc., are to be set up at Shaft No. 1 to sink to a depth of 1500 feet. The rock breaker will be rebuilt, an addition made to the concentrating room and a chlorination plant erected. There will also be a series of pumps put in.

Captain Hewitson, Supt. of the Norwegian mine, Tuttletown, and Foreman Thorpe have started work on the mine.

The Mt. Lily mine, near Columbia, has been bonded by Woodruff & St. Clair and has been started up again. Mr. St. Clair is Supt.

G. Bates of San Francisco has bought the L. C. Tibbitts stamp mill, which will be refitted and put on the Contention mine at Bourbon.

The Cracker Jack mine, near Columbia, has made a shipment of bullion from ore taken out in development work. Q. Eckel and W. E. Cole are the owners.

At the Contention mine on Knights creek, above Columbia, twelve men are employed. C. Summers is Supt. The mine is worked through tunnels. The company has rented the 2-stamp mill from J. T. Newcomer and is running it with a steam engine, reworking the tailings.

N. Clark, Mrs. R. D. Clark of Stanislaus, G. W. Kattan of Tuolumne, Mrs. M. L. Reed of Alameda and R. Robinson of Illinois have bonded to L. F. Triplett and T. F. Woodside of Tuolumne, J. W. Woodside of Stanislaus and A. L. Homer of Alameda 100 acres in section 15, township 2 north, range 14 east, known as the Springfield Tunnel Co.'s placer claim, on Table mountain, west of Columbia. The option is for twelve months at the price of \$18,000.

COLORADO.

CHAFFEE COUNTY.

A mill for the low-grade lead-silver ores in the Eclipse mine at Monarch will soon be in operation. This mine is bonded to the Fern M. & Leasing Co., of which J. C. Mitchell of Cripple Creek is president, B. Disman of Salida secretary and C. Bovard of Monarch general manager. The milling plant of the Ross M. Co. of Bonanza has been bought. Its capacity is fifty tons daily. The mill will be set up at Garfield and operated by water power.

CLEAR CREEK COUNTY.

The Eastern & Western G. M. & M. Co., operating the Chicago Belle mine near Dumont, has bought the Elm City claim, on which the Williams tunnel has been driven for 500 feet. Manager C. L. Jaynes has planned to drive the Williams tunnel ahead to intersect the Chicago Belle lode at a depth of 700 feet. The company owns water rights on Mill creek and will install a power plant and drive the tunnel with power drills.

Manager Wilcox reports that several ore bodies are opened up at the Waldorf

mines, at East Argentine, and the work of developing them will be carried on during the winter, preparatory to putting machinery on next spring to drive the tunnel through the range.

At the Gold Dirt mine at Empire the amount of ore blocked out is said to be greater than ever. It is understood that further development work will be pushed at once and the erection of a 100-ton mill has been determined on.

GILPIN COUNTY.

C. V. Hanks has leased the Woods mine near Central City. The mine is a producer of uranium in paying quantities. The shaft is about 200 feet deep and additional machinery to develop and operate the property will be put on by the lessee.

C. Hesselblum, Supt. of the Argosy mine at Central City, has let a contract to extend the 200-foot level.

The Gowers Syndicate are said to propose sinking the main shaft of the Run-ning lode in Black Hawk another 100 feet. The output for several months has averaged sixty tons of smelting ore, besides from 125 to 150 tons of mill concentrates. Mr. Dunstone, the manager, will also install a new steam pump.

The Cashier G. M. & Red. Co., through its agent B. L. Campbell of Central City, has bonded the Susquehanna claim, in Enterprise district, and will operate it for the company. The mine has produced a fair grade of ore.

Sinking has been suspended at the Ridgewood mine, in Central City, with the shaft down 620 feet. Two shifts are opening levels at that depth. Boston people are interested and C. F. Sydow is Supt.

GUNNISON COUNTY.

A. Hartman and L. F. Ball of Gunnison have leased the Carbonate King mine, near Ohio City, and will work all winter. The Carbonate King is owned by Gunnison and Pueblo people. The ore carries gold, silver, lead and copper.

LAKE COUNTY.

Owing to the stagnant condition of the sulphide market at Leadville, the yield for November will only be about 65,000 tons of all classes of ores, the greater portion being manganese, zinc and iron.

The Hap Hazard G. M. Co. of Leadville has leased the Hap Hazard mines in Lake Park and is now preparing to work on a very large scale. The company is placing a machinery plant on the ground. The new company is capitalized at \$1,000,000, and is headed by W. M. Harvey, J. M. Maxwell, W. A. Moore and T. Owens.

The Fanchon G. M. Co. is a new incorporation that will operate the Fanchon and surrounding territory, comprising seventy-two acres and located in the Sugar Loaf section, near Leadville. A new shaft is to be sent down to cut the several veins known to cross this ground.

The Penrose mine of the Leadville Home M. Co. is opening up an ore body, according to the statement of the manager, which is 375 feet long, 100 feet wide and 85 feet high, which would mean 193,000 tons of ore, which from present smelter shipments is averaging \$4.50 per ton.

MINERAL COUNTY.

The Jo Jo property, at Creede, owned by A. Kleasner, has been leased for seven years to C. Duncan and J. Davis at a royalty of 10% on all ore running less than \$30 and 20% on all ore over \$30 a ton. Considerable development work has been done in a tunnel. The new lessees are obligated to develop the claims.

OURAY COUNTY.

Manager Warner of the Ledge M. Co. of Ouray, states that the company has built a temporary shaft house on the mine and has repaired the hoisting plant, which was damaged in the fire of Nov. 15th. He says very high grade ore is coming in the low grade veins on the fifth level. The company has ordered a new mill plant to cost \$40,000, and it is expected to be running in the spring.

TELLER COUNTY.

The Fountain M. & M. Co. has been incorporated. The directors are T. C. Moritz of Gillett; J. C. Philippi and N. C. Palaferro of Omaha, Neb.; D. C. Kilpatrick, W. Hoover, N. T. Van Winkle and H. Barton of Falls City, Neb. The company will operate mines in the vicinity of Gillett.

The annual meeting of the Cripple Creek & Colorado M. & M. Co. has elected A. T. Bliss president and R. G. Mullen secretary and general manager, and subsequently instructed the directors to proceed at once to buy for the mine a new steam plant and compressor for machine drills at a cost of not to exceed \$15,000.

Lessee May, who is working on the Gould mine at Cripple Creek, says he will build a substantial shaft house and put on a steam hoist.

The Portland Co. at Victor in November shipped 9000 tons of ore and expects to exceed that record in December. The ore bins at No. 2 shaft have been repaired

and Supt. Trevarthen says that 5000 tons will be handled there this month and an equal amount at the No. 1 or Burns shaft. The bulk of the ore is being shipped to the smelter.

The Black Belle G. M. Co. has decided to operate its mine at Cripple Creek, with W. Bainbridge, Supt. of the El Paso, as general manager. The company will develop the mine from the 300-foot shaft, which will be put down to the 350-foot point, and a crosscut will be run thence to intersect the Black Belle vein, which has produced considerable ore in the upper workings.

W. F. Burns, manager of the Roanoke mine, at Cripple Creek, says he will start the property up soon. It is the intention of the company to put on a heavier plant of machinery and a set of pumps to unwater the property, when sinking will be resumed.

Stratton's Independence Co. has cut a station for the 1400-foot level, completing the 500 feet of sinking they started January last. All the boilers on the property will be operated by fuel oil.

The new schedule for the treatment of Cripple Creek ores makes the same rates at the mills and smelters. The rates are advanced on all ore carrying over an ounce of gold to the ton. The present rates and the old ones are:

| | New. | Old. |
|--------------------------------|--------|--------|
| Up to 1/2 ounce..... | \$3 00 | \$9 00 |
| From 1/2 to 3/4 ounce..... | 8 75 | 9 00 |
| From 3/4 to 1 ounce..... | 9 50 | 9 00 |
| From 1 to 1 1/4 ounce..... | 10 25 | 10 00 |
| From 1 1/4 to 1 1/2 ounce..... | 11 00 | 10 00 |
| From 1 1/2 to 1 3/4 ounce..... | 11 75 | 11 00 |
| From 1 3/4 to 2 ounces..... | 12 50 | 11 00 |
| From 2 to 3 ounces..... | 12 25 | 12 00 |
| From 3 to 5 ounces..... | 14 00 | 12 00 |

The above is the flat rate and the price includes freight and treatment. Ore carrying over five ounces gold to the ton is \$10.50 per ton plus freight, against \$9 per ton on the old rate. Where a miner makes a long-time contract with a 60-day cancellation clause, the rate will be \$1 per ton less than the above figures.

IDAHO.

BLAINE COUNTY.

The Federal M. & S. Co. of Omaha, Neb., has begun operations, putting in winter supplies and starting a few men to work on its mine at Muldoon. The management, it is said, intends next spring to construct a smelter of 100 tons daily capacity. W. T. Coad of Omaha, Neb., is president, and J. Barker of the same place secretary of the company. S. Friend of Hailey is Supt.

CUSTER COUNTY.

Mr. Thayer of Boston, principal owner of the Yankee Fork mine, near Bonanza, recently inspected the mine, and says that the mill, which is reducing from thirty to thirty-five tons a day, will next year be enlarged to double its present capacity, a tramway will be put in, and the mill will be run by electricity.

IDAHO COUNTY.

The Klondike M. & M. Co., near Pierce City, has started its stamp mill. The intention is to make a two months' test of ore so far mined. Two hundred tons will be selected of average ore for this purpose. There are several thousand tons on the dump. C. T. Beckwith of Oberlin, Ohio, is president of the company, and A. Niebergall of Walla Walla, Wash., is secretary.

KOOTENAI COUNTY.

W. C. Brower of Coeur d'Alene, president of the Home Builder M. & D. Co., which owns six claims of free milling gold ore at Wolf Lodge creek, reports that the tunnel has been driven 40 feet, and in another 50 feet will cut the vein 100 feet down. The company will work all winter.

LEMHI COUNTY.

The Queen of the Hills group and stamp mill, near Salmon City, have been bought by Salt Lake City, Utah, people, including M. Shaughnessy. E. Hill, the present owner, is to receive, it is reported, \$50,000 within thirty days for the property. It is reported that the change in owners will be followed by the erection of a larger milling plant.

Tin in veins is reported struck in considerable quantities, according to N. I. Andrews of Salmon City, who says the strike was made on Panther creek, near Salmon City. Stream tin has been found there before.

OWYHEE COUNTY.

A mining suit over the title to the Golden Chariot mine, near Silver City, has been brought in the United States Court at Boise by the company, the stockholders of which are largely San Francisco people, against T. Regan of Boise and the War Eagle Con. M. Co. The Golden Chariot was closed down after 1873 and subsequently relocated and finally passed into the ownership of Regan. The War Eagle Co., holding an option from

Regan, is driving a long tunnel, now in over a mile, in order to reach the vein several hundred feet below the old workings. The present suit is brought for the purpose of recovering the title to the mine, it being alleged that the relocation of the property for alleged non-performance of assessment work was the result of fraudulent conspiracy.

The Blue Bird mine in Plixley basin, about 35 miles east of Silver City, owned by Miller, Kane & Watts, is developed by two tunnels, one 180 feet in, cutting the vein 75 feet down. The vein, it is claimed, averages between 3 and 4 feet in width and smelter returns from shipments show 230 ounces in silver, \$4 gold and 10% lead.

The War Eagle tunnel under War Eagle mountain is in 5700 feet. Estimated distance to Charlot vein, yet to drive, 600 feet. Average progress, about 10 feet every twenty-four hours.

The Howe-Manhattan Gold Mines, Ltd., capital \$100,000, has been incorporated at Boise. The officers are T. Regan president and B. S. Howe secretary and treasurer. The company will develop the Howe-Manhattan group at DeLamar.

P. B. Armstrong, representative of the New York company that has purchased the Banner and Esmeralda mines at Florence, says that the shaft on the Banner mine, now down 200 feet, will be sunk 200 feet deeper this winter. The company has a mill with a capacity of fifty tons daily. Besides the shafts, 1200 feet of drifts have been run on the property, opening up, it is claimed, 20,000 tons of ore. The mill is expected to be running by January 15.

SHOSHONE COUNTY.

The Empire State-Idaho M. & D. Co. has received a new 250 H. P. engine for the Tiger mill at Burke, which will be used to replace the 125 H. P. engine put in when the mill was built in 1896. Besides this engine the property is equipped with an electric power plant, using a water power.

The Banner M. Co. has let a contract to O. B. Olson to extend its tunnel near Wallace 400 feet.

The Flagstaff G. & C. M. & M. Co., with office at Mullan, has been incorporated, capital \$500,000. The officers are W. H. Fraser president and J. E. St. Jean secretary.

WASHINGTON COUNTY.

The smelting plant of the Boston & Seven Devils C. Co., J. A. Smith, superintendent, near Weiser, has been completed, with the machinery all in place, the buildings wired and electric plant installed. Before the plant will be started up a 100,000-gallon water tank and pumping plant will be installed.

MICHIGAN.

HOUGHTON COUNTY.

A third fissure vein of mohawkite has been struck in the Mohawk mine, near Houghton, being found in the second level south from No. 3 shaft. Like the other two veins, it has been found to increase in width going down on it. The Mohawk is now opening up the ground between its four shafts and will soon resume sinking in all shafts.

MONTANA.

DEER LODGE COUNTY.

The owners of the Hannah group, near Anaconda, are preparing for extensive development work during the winter and propose to start a tunnel, to be 800 feet in length, to cut the ore bodies prospected and developed near the surface. L. Burnett of Anaconda, one of the owners, says that on one claim the developments have exposed a vein 60 feet wide which will average over \$6 per ton. The tunnel is to be run with the expectation of subsequently building a mill.

FERGUS COUNTY.

The Philippine group of cyanide prospects, in the Armells district, has been bonded to F. A. Case, representing New York people, at \$60,000, and Mr. Case is now developing the property. The ores of this property so far have been low grade, running from \$2.60 to \$4.50 per ton.

The Speculator Co. of Butte has bought the Fourth of July and several other adjacent groups of mining properties at Pony, paying for them, it is reported, \$50,000.

MADISON COUNTY.

The Omaha & Montana M. Co., of Helena, has bought the Fourth of July mine at Jeanette, paying for it \$50,000. It is the intention of the company to work the property along with the Mammoth claim adjoining.

SILVER BOW COUNTY.

H. L. Frank and J. A. Murray, owners of the Gem mine near Butte, are preparing to sink the shaft 300 feet deeper, down to the 1000-foot point. They have ordered machinery of sufficient capacity to do the work and will begin sinking as soon as it is in place.

NEVADA.

ELKO COUNTY.

C. Brossemer of Bullion states that the Raine copper mine at Bullion has been bonded to Senator Clark of Montana, and that extensive operations will be commenced on it in the spring.

LYON COUNTY.

The Dyer copper claims in Mason Valley, including the old Daniels copper mine, have been bonded to J. A. Cruikshank of Cincinnati, Ohio, at \$40,000 for nine months. Extensive development work on the group is planned to commence in January next.

The Carson river mills at Dayton and Empire expect to be called upon to crush Tonopah ore. Several tests have been made in a number of them and all are said to show the ore to be free milling. One mill, on a test of twenty tons, saved over 90% of all values on the plates and in the pans without cyaniding. Another mill with cyanide treatment offers to return 93% of the silver and 95% of the gold. A number of the mills, it is said, are now making arrangements to work so-called low grade ore.

NYE COUNTY.

The Tonopah M. Co. will take over the mines of the Butler group at the end of December and plans and specifications are being drawn up for large works. Two carloads of machinery are now en route, with a galloways-frame for the shaft. The company intends to sink to a depth of 500 feet, and if the ore bodies hold out water will be brought to the mines from a distance of 45 miles. The cost of putting in water works and other improvements will, it is stated, be \$750,000. Although 500 horses are engaged in hauling ore between Tonopah and the railroad, it is estimated that the ore now on the dumps cannot be moved before next May.

The Tonopah T. & M. Co. has been incorporated at Tonopah, capital \$1,000,000. The directors are C. Brougher, R. C. Gordon, A. L. Hudders, L. L. Oddie and P. Manning, all of Butler P. O.

WASHOE COUNTY.

At the Empire Copper Co.'s mines at Pyramid seventeen men are employed. Supt. Parry says an upraise in the mine has reached an ore body 8 feet in thickness that is exceedingly rich, assaying from 22% to 39% copper, thirty-five ounces silver and \$5 in gold. The ore is azurite.

NEW MEXICO.

LINCOLN COUNTY.

G. W. Hunt has sold his mines near Nogal to J. M. Rice of Parsons City for \$15,000. The assay returns show gold values of \$4 to \$7 per ton from a wide lead and increasing values with depth. The ore is free milling. J. M. Rice has also bought from a Mrs. Anderson of Nogal a group of claims for \$6000.

RIO ARRIBA COUNTY.

E. F. Mertz, representing the St. Michael's M. Co. of Milwaukee, Wis., has made an inspection of the War Eagle group, near Bromide district, and has made contracts for the erection of mine buildings and will keep the mine in operation all winter.

SAN MIGUEL COUNTY.

The Las Vegas Copper Extraction Co. has incorporated at Santa Fe, capital \$500,000. The directors are H. W. Kelly and C. C. Robins of Las Vegas, F. Williams, G. B. Dodge, J. W. Freeman and J. P. Hall of Denver, Colo., and F. H. Hitchcock of Washington, D. C. The office will be at Las Vegas, with a branch office in Denver.

OREGON.

BAKER COUNTY.

The Bonanza mine, Thatcher Supt., near Baker City, makes a November cleanup, it is said, of \$60,000. In addition there is a large output of concentrates, said to be equal in value to the bullion. The Gem mine, in the Sanger district, near Baker City, has been turned over to F. E. Geiser, who has made final payment of \$15,000.

GRANT COUNTY.

The owners of the Magnolia mine, near Granite, have bonded the mine to L. Y. Keedy of Portland at \$100,000.

JOSEPHINE COUNTY.

After a close down for several months the Ida quartz mine, near Grant's Pass, has been started. Two tunnels have been run to the ledge, which is from 12 inches to 4 feet wide. The values are carried in both free gold and sulphurets and range from \$12 to \$25 per ton.

The Gipsy Queen mine at Althouse is a quartz proposition, owned by H. Luethy. The gold comes from a small stringer which has proven very rich. Recently \$2300 was taken from a length of the vein of 23 feet, worked 2 to 4 feet deep from the surface.

The owners of the Copper Stain mine

n the Mount Reuben district, north of Grant's Pass, have concluded to install a 10-stamp mill and other machinery. J. A. Connelly of Springfield, O., one of the principal owners, who has just returned from a visit to the mine, reports that a wagon road will be built to take the new machinery in.

T. W. M. Draper of San Francisco, owner of the Waldo copper mines, states that as soon as the new roads and other improvements are completed about the mines he will put 200 men to work taking out ore and the smelter will be started.

The Granite Hill group of Louse creek, north of Grant's Pass, has been bought by Booth Bros. & Mangum and W. J. Morphy of Chicago, Ill., and M. A. Lathrop of Briton, Mass. The price paid was \$75,000, part down. The mine has both placer and quartz lodes. The latter are under development, but the placer has been worked for many years past, producing annually from \$10,000 to \$20,000. The claims are equipped with several miles of ditches and flumes and two giants.

SOUTH DAKOTA.

LAWRENCE COUNTY.

The Highland Chief M. Co. has started up its new cyanide mill at Deadwood. The mine is claimed to have paid quite well with a 20-stamp mill, but the ore changing, became too refractory to amalgamate well. Experiments have shown that the ore is adapted to cyanide treatment. The new plant has a capacity for about eighty tons daily. The ore runs considerably better than \$10 per ton gold and there is a large amount of it blocked out.

UTAH.

EMERY COUNTY.

The Hecker M. Co. has been incorporated at Salt Lake City; capital, \$30,000. H. Hardy is president and C. B. Jack treasurer and secretary. The company owns the Eagle Nos. 1, 2 and 3 claims in the Summerville mining district. Little development work has been done on the mines. They show a vein said to be 40 feet wide carrying ore with copper, silver and lead.

JUAB COUNTY.

The Western Union M. Co. has been incorporated at Tintic; capital, \$30,000. The officers of the company are C. E. Miller president and D. A. Depue secretary and treasurer. The company owns the Wildcat, Miller, Silver King, Surprise and Copper Queen claims at Tintic.

PIUTE COUNTY.

The Lone Tree G. & S. M. Co. has been incorporated in Salt Lake City; capital, \$5000. The officers are H. W. Ramlose president and J. Christiansen secretary and treasurer. The company owns the Fraction V., Lone Tree, Spar, Overland No. 2, Union, Cinnamon and King Solomon claims in the Gold Mountain district.

SALT LAKE COUNTY.

The Columbia M. Co., having bought the Madge ground, in upper Bingham, is running a tunnel from it to go under the old Columbia workings and save sinking the shaft. It has been definitely decided by the company to build a mill next spring.

The owners of the Nancy Hanks mine of Bingham have contracted for 300 feet of tunneling to the first ledge. The development is to be under the management of J. B. King.

SEVIER COUNTY.

The Pride of Sevier M. & M. Co. has been incorporated at Milford; capital, \$25,000. E. Malmquist is president and C. Meyer, Sr., secretary. The company owns the Blue Bird, Lucky Boy, Surprise and Humbug claims.

SUMMIT COUNTY.

Supt. R. Campbell of the Wabash mine, at Park City, stated that the shaft was under 160 feet and the gallow's frame up. Work on the new compressor pit has been started.

At the Daly-West workmen are employed putting a 6-inch pipe from the 1200 level up to the collar of the shaft. The pipe will empty in a bin on the 1200 level and will take the concentrates from the mill to that point, where they will be loaded into cars for transportation through the tunnel to the shipping station. The improvement does away with the wagon haul.

The Insley group on Scott Hill, at Park City, is leased to A. F. Fern and F. Dallimore, who are sinking on the vein toward, they believe, a good body of high-grade ore.

A strike has been made in the St. Louis and Vasar ground, near Park City, by the leasers. The strike is in the lower workings and an assay returned 49.60 ounces silver, 0.10 gold and 54% lead. W. De Lashmuth of Park City is one of the leasers.

TOOELE COUNTY.

The sampling of the Rover, the Gold

Dust, Silver Lode and the Geyser-Marion group at Mercur, preliminary to their amalgamation under a single head, has been completed. The idea of the projected consolidation is to have the ores of all the mines go to one mill. F. D. Kimball and G. Dorsey of Salt Lake City are the principal promoters of the plan of amalgamation.

The Lake Side M. Co. has been incorporated, capital \$30,000. The officers are: P. W. Madsen, president; R. W. Madsen, secretary and treasurer. The company owns the Neilson group of six claims in the Lake Side mining district.

WASHINGTON.

FERRY COUNTY.

C. T. Porter, Supt. of the Gold Lion & Little Four Con. M. Co. at Republic, has resumed work on the property and is driving the tunnel, which is now in 200 feet.

Manager Hedges of the Wauconda G. M. Co., at Wauconda, says the tunnel is being driven 6 feet each twenty-four hours and is now in 950 feet.

STEVENS COUNTY.

The Easter Sunday G. & C. M. Co., in the Pierre Lake district, near Marcus, is preparing to install a reduction plant. The company has a sawmill in operation and is getting out lumber for buildings.

WYOMING.

CARBON COUNTY.

Assays of ore from the strike made by N. Calmon at Grand Encampment run from 10% to 30% copper, \$2.50 to \$10 gold and about \$8 silver. The vein is claimed to be 7 feet wide.

FOREIGN.

BRITISH COLUMBIA.

The Chicago Copper & Smelting Co. has been incorporated, with offices at Greenwood, B. C., and office at Chicago, Ill. The capital is \$750,000 and the company will develop mining claims and build a smelter. It has bought the Arlington claim at Greenwood.

The Granby smelter at Phoenix is to install a briquette plant to treat flue dust. The plant will have a capacity of 100 tons daily. One of the converters in the smelter will be in operation about New Year's, one of the new furnaces on January 15, and the entire enlarged plant is expected to be in blast not later than February 1.

A steamer is to be put on Horsefly lake, which will cover 25 miles of the route to the late discoveries. A sawmill is to be put in by the Miocene Co. at Harper's Camp and several stores are to be stocked during the winter, using the snow to sled the supplies in.

The annual meeting of the British Columbia Mining Association was held at Nelson on the 5th inst. The officers of the association were re-elected as follows: President, J. R. Robertson; vice-presidents, F. Robbins, manager North Star mine, and B. McDonald, manager of Rossland Great Western M. Co.; secretary, R. F. Tolmie.

KLONDIKE.

The manager of the Dominion Government purchasing assay office in Vancouver says that Klondike miners might increase by thousands of dollars the production of their claims if they saved the platinum that was thrown away in tailings and other waste. He said that in bags of gold assayed in his office there was frequently a good return of platinum.

MEXICO.

About 25 miles west from Carbo, Sonora, the Alma M. Co. are developing a copper property, with A. Graves as manager. Several shafts are being sunk and levels run. From one shaft a level has cut 33 feet width of copper ore of fair grade. Another shaft, inclined with the ledge, is down 100 feet, in good ore all the way.

The American Smelting & Refining Co., which had secured control of all of the principal smelting plants in Mexico, it is reported, is to have competition, companies having been formed to build independent smelters. These are located at Hidalgo del Parral, Guanacavi, Ameca, Torreon, Mapina, Durango and Tepic.

W. B. Gester, Supt. of the quicksilver mine at Saucillo, Chihuahua, states that that mine will not be worked for the present.

Recently Declared Mining Dividends.

| | Payable. |
|---------------------------------------|----------|
| Elkton Con. G. M. Co., Colorado, | |
| 4 cents per share, \$100,000..... | Dec. 20 |
| Daly-West S. M. Co., Utah, | |
| monthly, \$60,000..... | Dec. 16 |
| Elkton Con. M. Co., Colo., quarterly, | |
| 4 cents per share, \$100,000..... | Dec. 11 |
| El Paso G. M. Co., Colorado, 1 | |
| cent per share, \$24,250..... | Dec. 25 |
| Silver King S. M. Co., Utah, | |
| monthly, 66½ cents per share, | |
| \$100,000..... | Dec. 10 |

Personal.

C. C. BEAN is Supt. of the Aja M. Co., near Gila Bend, Ariz.

H. G. BOND of Santa Clara, Cal., is in Salt Lake City, Utah.

GEORGE BARKLEY has returned from Mexico to Clifton, Ariz.

D. C. JACKLING's permanent address is Colorado Springs, Colo.

G. MCM. ROSS has been re-elected Supt. Mexican M. Co., Virginia, Nev.

C. O. HAMILTON, M. E., of Boston, Mass., is sojourning in Butte, Mont.

A. P. CHITTENDEN has been appointed Supt. Pioneer mine, near Towles, Cal.

H. A. KELLER, manager Trinity Copper M. Co., at Kennet, Cal., has resigned.

W. G. RICHARDS has been appointed Supt. Oriole mine, at Angels Camp, Cal.

C. SUMMERS has been appointed Supt. of the Contention mine, near Columbia, Cal.

F. W. BRADLEY of San Francisco, Cal., has gone to Mexico to remain a few weeks.

MR. GUS TAYLOR succeeds L. R. Mead as secretary Risdon Iron Works, San Francisco, Cal.

MANAGER SINGLETON of the Yellow Aster mine, Randsburg, Cal., has gone to Honolulu, H. I.

A. J. MCMILLAN, managing director Snowshoe mine, at Rossland, B. C., has gone to London.

H. C. JOHNSON, late chemist at the Cananea mines, in Sonora, Mexico, is at Randsburg, Cal.

N. B. KNOX, M. E., has returned to San Francisco, Cal., from a reconnaissance through northwestern Idaho.

W. G. NEBEKER has returned to Salt Lake City, Utah, from several weeks' sojourn in Arizona and California.

O. W. HARPER, who is manager of a large mine in Ecuador, is now sojourning in Minas Prietas, Sonora, Mexico.

F. S. GOLDSMITH has been appointed manager of the Seaton M. Co., at Idaho Springs, Colo., succeeding J. J. May, resigned.

W. A. HENDRYX of British Columbia was at Prescott, Ariz., on the 8th inst., en route to the Empire mine on Groom creek, of which he is manager.

W. C. PIDGE, who was Supt. Inyo Marble Co., near Bishop Creek, Cal., for several years, is now Supt. Belle mine, near Benton, Mono county, Cal.

W. L. THURSTON, formerly Supt. Omaha, Homeward Bound and Lone Star mines, at Grass Valley, Cal., has returned to that place from the Transvaal, S. A.

W. BAINBRIDGE, superintendent of the El Paso mine, at Cripple Creek, Colo., has been appointed manager for the Black Belle G. M. Co., which owns the adjoining claim to the El Paso.

M. F. PARRY, manager of Butters & Co. cyanide plant at La Colorado, Sonora, Mexico, is at Virginia City, Nev., superintending the erection of the Butters & Co. cyanide plant at that place.

W. S. GRAHAM, civil and mining engineer of Auburn, Cal., it is reported, is to be appointed U. S. Surveyor General for California, succeeding to the vacancy made by the death of J. M. Gleaves.

ROBERT ANGUS, mentioned in last week's issue as being superintendent Le Roi M. Co., Rossland, B. C., at an annual salary of \$12,000, leaves the company's employ, as the position he held has been abolished by the company. The highest official at the mine proper will in future be the foreman. L. W. Gunkle has this appointment. The new foreman was formerly in charge of the Utica mine and the Pine Tree and Josephine mines of California.

Books Received.

"Contributions to the Mineralogy of California," by Walter C. Blasdale, and "Mineralogical Notes," by Arthur S. Eackie, with "Chemical Analysis," by W. T. Shaller, are two bulletins of the Department of Geology of the University of California that will be found interesting by specialists in the mineralogy of California. They are parts of the cumulating work that ultimately will make the technical mineralogical literature of California as complete and economically useful as that of Germany is to-day. Published by the University of California at Berkeley, Cal. Price, 15 cents and 10 cents respectively.

"Architectural Engineering," with special reference to high building construction, second edition, rewritten, by Joseph K. Freitag, B. S., C. E., 8vo., 407 pages with 196 figures and illustrations. The work gives in a compact practical form the essential principles of engineering ap-

plied to modern building construction, and has brought down to date in collective form the results of the continually improving practice of the last seven or eight years. The book will be found valuable as a text book for students of modern architecture and useful for reference to the practicing architect. Published by John Wiley & Sons, New York, and Chapman & Hall, Limited, London. Price, \$3.50.

Commercial Paragraphs.

THE preliminary census report on the manufacturing industries of San Francisco show a total capital invested in the industry of \$80,103,367—an increase of 7% over 1890. The value of products in 1900 was \$133,069,416—a decrease of almost 2%. There are 4002 establishments, 41,988 wage earners, \$22,037,527 wages, \$3,826,167 miscellaneous expenses, and \$79,492,952 worth of material used.

COUPLERS, commonly used for connecting hose to hydrants and coupling sections of hose together, are of a type or pattern so long approved that many users of hose have supposed they were the best that could be contrived. Seven years ago Joseph Blackburn, a mechanic of Salem, Ohio, invented and patented what is now known as the "Quick as Wink couplers," so called for the remarkably short time required to couple or uncouple. They are said to be in use in the fire departments of many cities and towns of Ohio and western Pennsylvania, where the old-style couplers have been discarded to give place to the improved one. The greater facility with which firemen handle their hose, having the Quick as Wink couplers on them, compared with handling hose with the old-style couplers, is said to be wonderful, one man being able to make or break a connection in less than a fifth of the time required for two men to do the same with the old couplers. Users of compressed air in shops, shipyards, bridge works, etc., where small hose has to be used, are finding these quick-acting couplers to be time savers, on account of the convenience with which hose can be detached from one place and attached to another place, and several large plants in the East have them in use. Persons desiring more particulars about this improvement should write to the W. J. Clark Co., Salem, Ohio.

A BUSINESS CHANGE which will be of considerable interest is that by which the old established mining supply house of the Parke & Lacy Co., San Francisco, Cal., goes into the hands of Harron, Rickard & McCone. This was brought about by the recent death of Mr. B. T. Lacy, the late President of the Parke & Lacy Co., and the disinclination of the heirs to continue. Of those who will carry on the business hereafter, Mr. J. O. Harron and Mr. Thomas Rickard have long been associated with the old company and for the last few years they have been entrusted with its active management. They are, therefore, thoroughly conversant with the work they undertake and are well and favorably known. Nothing less can be said of Mr. A. J. McCone, who, although not heretofore a resident of San Francisco, is known by many interested in mining as the successful proprietor of the Fulton Foundry, Virginia City, Nev., and Vice-President of the Fulton Engine Works, Los Angeles, Cal. He brings with him a host of friends to the new concern and a great fund of information for the benefit of its clients. The firm of Parke & Lacy has been advertising continuously in the MINING AND SCIENTIFIC PRESS for twenty-five years, and while it seems like losing an old friend to note the absence of the old firm name in our advertising columns, nevertheless this journal heartily congratulates the new concern and wishes them the unbounded success which they deserve. The officers of the new company are as follows: J. O. Harron, President; Thomas Rickard, First Vice-President; A. J. McCone, Second Vice-President; Thomas Steel, Secretary; Louis C. Graupner and James H. Mundy, Directors. The business will be continued at the old headquarters, 21-23 Fremont St., San Francisco, Cal., and branches will be conducted as before at 306 Byrne Building, Los Angeles, Cal., and at Bakersfield, Cal.

Catalogues Received.

THE Allis-Chalmers Co. has issued Book No. 1, a trade catalogue of mining machinery specially descriptive of the Gates rock and ore breaker, and Catalogue No. 9, eighth edition, devoted to the presentation and explanation of concentrating machinery. Both catalogues are up to date and will be found desirable, handy additions to the working library of the millman and expert metallurgist. They can be had on application to the Allis-Chalmers Co. at Chicago, Ill.

Latest Market Reports.

SAN FRANCISCO, Dec. 12, 1901.
SILVER.—Per oz., Troy: London, 25½d (standard ounce, 925 fine); New York, bar silver, 54½c (1000 fine); San Francisco, 54½c; Mexican dollars, 47c San Francisco, 43½c New York.
COPPER.—New York: Lake, 1 to 3 casks, \$17.25; carload lots, \$16.85; Electrolytic, 1 to 3 casks, \$16.75; carload lots, \$16.62½; Casting, 1 to 3 casks, \$16.00; carload lots, \$16.50. San Francisco: 18. Mill copper plates, 20c; bars, 22½c. London: £54 7s 6d per ton.
The quotations are nominal. Sales are certainly being made below the quotations.
LEAD.—New York, \$4.37½; Salt Lake City, \$4.00; St. Louis, \$4.40; San Francisco \$4.90, carload lots; 5½c 1000 to 4000 lbs.; pipe 8, sheet 6½, bar 5½c; pig, 5.25. London, £10 15s per ton—2.36 cents per lb.
SPELTER.—New York, \$4.20; St. Louis, \$3.75; London, £16 2s 6d per ton—3.58½ cts. per lb.; San Francisco, ton lots, 5½c; 100-lb lots, 6c.
ANTIMONY.—New York, Cookson's, 10c; Hallett's, 9c; San Francisco, 1000-lb. lots, 10c; 300 to 500 lbs., 11c; 100-lb. lots, 13½c.
IRON.—Pittsburg, Bessemer pig, \$16.50; gray forge, \$14.00; San Francisco, bar, 2.60c per lb., 2.65c in small quantities.
STEEL.—Bessemer billets, Pittsburg, \$24; open hearth billets, \$26.50; San Francisco, bar, 7c to 12c per lb.
NICKEL.—New York, 50¢@60¢ p. lb.
TIN.—New York, pig, \$27.50; San Francisco, ton lots, 27c; 1000 lbs., 27½c; 500 lbs., 27½c; 200 lbs., 27½c; less, 28c; bar tin, 32½c.
PLATINUM.—San Francisco, crude, \$19 ½ oz.; New York, \$20.50 per Troy oz.
BISMUTH.—New York, 3½ d. 50-lb casks; San Francisco, \$2.50 to \$2.75 p. lb.
QUICKSILVER.—New York, \$51.00 large lots; London, £9 2s 6d; San Francisco, local, \$48.00 p. flask of 76½ lbs.; Export, \$45.00.
MAGNESIUM.—New York, \$2.90 p. lb.; San Francisco, \$3.75.
ZINC.—San Francisco, 5½c; slab, 5½c; bar, 7c; zinc dust, N. Y., 8c.
BABBITT METAL.—San Francisco, No. 1, 10c.
ALUMINUM.—New York, No. 1, 99% pure ingots, 35c; No. 2, 90%, 30c to 35c.
SOLDER.—Half-and-half, 100-lb. lots,

18c; San Francisco, Plumbers', 100-lb. lots, 15.25c.
PHOSPHORUS.—F. o. b. New York 50¢@60¢ p. lb.
ASSAY LITHARGE.—San Francisco, 10c p. lb, small lots.
FERRO-TUNGSTEN.—New York, 37½, 32c; San Francisco, 65c (60%).
POWDER.—F. o. b. San Francisco: No. 1, 70% nitro-glycerine, per lb., in carload lots, 15½c; less than one ton, 17½c. No. 1*, 60%, carload lots, 13½c; less than one ton, 15½c. No. 1** 50%, carload lots, 11½c; less than one ton, 13½c. No. 2, 40%, carload lots, 10c; less than one ton, 12c. No. 2* 35%, carload lots, 9½c; less than one ton, 11½c. No. 2** 30% carload lots, 9c; less than one ton, 11c. Black blasting powder in carload lots, minimum car 728 kegs, \$1.50 per keg; less car lots, \$2 per keg.
CAPS.—3x, \$5.50 per 1000; 4x, \$6.50; 5x, 8; Lion, 8, in lots not less than 1000.
FUSE.—Triple tape, \$3.60 per 1000 feet; double tape, \$3.00; single tape, \$2.65; Hemp, \$2.10; Cement No. 2, \$3.00; Cement No. 1, \$2.65, in lots of 3000 feet and up.
CANDLES.—Granite 6s, 16 oz., 40s., 10c p. set; 14 oz., 40s., 9c.

New Patents.

DEWEY, STRONG & CO.'S SCIENTIFIC PRESS PATENT AGENCY, 330 Market St., S. F., has official reports of the following U. S. patents issued to Pacific coast inventors:
FOR THE WEEK ENDING DEC. 3, 1901.
688,053.—BOILER—J. H. Arrasmith, Colfax, Cal.
688,332.—RAILWAY—W. L. Beach, Los Angeles, Cal.
687,979.—TEA STRAINER—D. Chambers, San Jose, Cal.
687,818.—CAR FENDER—J. Craig, S. F.
688,238.—SACK HOLDER—T. J. Davis, Portland, Or.
687,918.—ORE FURNACE—F. B. Durr, Tacoma, Wash.
687,975.—GOLD SAVER—Flatland & Lister, Vallejo, Cal.
688,083.—CAN SOLDERING MACHINE—J. W. Green, Astoria, Or.
687,745.—CAMERA—F. H. Grover, Fremont, Wash.
687,983.—BOX—Rose M. Hartnett, Santa Barbara, Cal.
687,980.—CLOD CRUSHER—T. J. Hubbell, Watsonville, Cal.
687,956.—POWER PRESS—Jacob & Arthur, Salem, Or.
687,830.—GOLD SAVER—J. A. Kirk, S. F.
687,892.—BOUQUET HOLDER—J. Luth, Alameda, Cal.
688,001.—LOCK—F. H. Mills, Klamath Falls, Or.
688,192.—HAIR CURLER—E. Myette, Fairhaven, Wash.
687,882.—WATER WHEEL—J. Richards, S. F.
687,853.—PUMP—J. Richards, S. F.

Notices of Recent Patents.

Among the patents recently obtained through Dewey, Strong & Co.'s SCIENTIFIC PRESS U. S. and Foreign Patent Agency, the following are worthy of special mention:
STARTING DEVICE FOR EXPLOSIVE ENGINES.—No. 688,040. Dec. 3, 1901. W. E. Twichell, St. Helena, Cal. The object of this invention is to provide a starting mechanism for what is known as gas or explosive engines. It consists of engaging clutch members, one fixed to the shaft and the other slidable and revolvable on the shaft, a disk fixed on the revolvable clutch member, a second disk revolvable on the hub of said member, a spring having one end secured to one disk, and its opposite end to the hub of the other disk, a third disk fixed to the shaft which is adapted to engage the fixed disk so that they are made to revolve in unison and coil the spring. By means of ratchets and pawls the disks are engaged and the coil held tenses, and when automatically released by suitable connecting mechanism the spring acts to revolve the shaft sufficiently to start the engine.
CLOD CRUSHERS.—No. 687,981. Dec. 3, 1901. T. J. Hubbell, Watsonville, Cal. Assigned to D. Hubbell and W. H. Ames of same place. This invention relates to an apparatus for crushing and pulverizing clods. It comprises a frame with means for drawing or propelling it over the ground, a series of boards or plates pivoted transversely across the frame and turnable therein, one or more of said plates having knives or cutters projecting downwardly and backwardly therefrom, and others having cultivator teeth similarly projecting while the final plate without teeth carries a seat and is adapted to smooth the surfaces of the ground after the other plates have acted upon it.
TEA STRAINER.—No. 687,979. Dec. 3, 1901. D. Chambers, San Jose, Cal. One-half assigned to L. B. Chambers of San Jose, Cal. This invention is designed to prevent the escape of tea leaves and sediment from the spouts of tea pots and the like. It consists of one or more groups of elastic wire or hair-like filaments arranged to radiate from a central flexible support to which they are connected at intervals so that when inserted into the spout or nozzle they form radiating strainers at intervals from one end to the other. In connection with this is a loop or stop to retain the device in place and by which it can be withdrawn at will.

SITUATIONS WANTED.

WANTED.—By competent man, position as superintendent or assistant superintendent of gold mine. Understands milling and amalgamating thoroughly. Also practical assayer. Address G. H., care Mining and Scientific Press.
WANTED.—SITUATION AS MANAGER OR Superintendent of gold, silver or lead property. Twenty years' experience in managing properties, building mills and ore concentration. Best of references and bonds furnished. Address J. A., care of this office.
MINE FOREMAN WANTS POSITION WITH a big gold mining company. Over 20 years' experience in shaft sinking, timbering, developing and working large gold mines both with machine and hand drills. Address R. F., care of Mining and Scientific Press office.
WANTED.—Situation to take charge of a gold mining plant. I have had 15 years' experience in assaying, amalgamating and concentrating California gold ore. Also understand cyanide and canvas treatment of tailings. Correspondence solicited. Address Wilton E. Darrow, Sutter Creek, Cal.
YOUNG MINING ENGINEER, graduate of one of the best mining schools, desires position. Familiar with Colorado mining and milling practice. Several years' practical experience in assaying, mining and milling. Can assay, survey, keep books, etc. Speak Spanish. Address R., 125 Kittredge Building, Denver, Colo.
WANTED.—POSITION AS ASSAYER OR Superintendent of a mine. Have had experience in putting up mills, cyanide plants, smelters and mine machinery and operating them. Have a good assay outfit. Address Jesse L. Wetmore Jr., Piedmont, Alameda Co., Cal.
ASSAYER WANTS POSITION AT A LARGE gold mine. Thoroughly competent, with wide experience as assayer at copper, silver and gold mines. Now assayer at big mother lode mine. Address R. A., care of Mining and Scientific Press.
WANTED.—A position by a first-class all-round millman. Understands amalgamating and concentrating and care of mills. Twenty-five years' practical experience. Arizona or Mexico preferred. Satisfactory references given. Address "Millman," care Mining and Scientific Press.
THE CALIFORNIA DEBRIS COMMISSION, having received applications to mine by the hydraulic process from W. W. Stone, Sr., in the Red Hill Gravel Mine, near Placerville, El Dorado Co., to deposit tailings in a worked-out pit; from Mrs. Olive A. Stone, in the Ciganc Gravel Mine, near Placerville, El Dorado Co., to deposit tailings in Webber Creek; and from J. B. Lassiat, in the Lassiat Mine, at Poker Flat, Sierra Co., to deposit tailings in a worked-out pit, gives notice that a meeting will be held at Room 59 Flood Building, San Francisco, Cal., on December 23, 1901, at 1:30 P. M.

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WANTED.

WANTED.—A FIRST-CLASS MECHANIC.
One who can do the repair work for a 40-stamp mill and pumps, dynamo and telephone. Must be sober and industrious and furnish the best of references. Good wages with a good company. Address "Gold," care of this office.

WANTED.**Developed and Partly Developed Gold and Copper Mines.**

Full expert reports, maps and 90 days' exclusive options must be furnished. Have CASH CUSTOMERS for worthy properties.
L. W. TULLEYS, COUNCIL BLUFFS, IA.

ASSESSMENT NOTICES.

DUDLEY MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Bodie, Mono County, California.

Notice is hereby given that, at a meeting of the Board of Directors, held on the 11th day of December, 1901, an assessment (No. 12) of two (2) cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin to the secretary, at the office of the company, Room 56, No. 309 Montgomery street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 13th day of January, 1902, will be delinquent and advertised for sale at public auction; and, unless payment is made before, will be sold on THURSDAY, the 4th day of February, 1902, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

J. STADTFELD JR., Secretary.

Office—Room 56, No. 309 Montgomery street, San Francisco, California.

NATIONAL CONS. MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Rich Gulch, Shasta County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 15th day of November, 1901, an assessment (No. 15) of five (5) cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin to the secretary, at the office of the company, 773 Mission street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 26th day of December, 1901, will be delinquent, and advertised for sale at public auction; and, unless payment is made before, will be sold on THURSDAY, the 23d day of January, 1902, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

GEO. W. FLEISSNER, Secretary.

Office—773 Mission street, San Francisco, California.

ORLEANS CONSOLIDATED MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Grass Valley, Nevada County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 15th day of November, 1901, an assessment (No. 1) of two (2) cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin to the secretary, at the office of the company, 824 Pine street, Room 10, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 28th day of December, 1901, will be delinquent and advertised for sale at public auction; and, unless payment is made before, will be sold on THURSDAY, the 30th day of January, 1902, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

GEO. P. THURSTON, Secretary.

Office—324 Pine street, Room 10, San Francisco, California.

LARKIN MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, El Dorado County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 17th day of November, 1901, an assessment (No. 11) of two cents per share was levied upon the capital stock of the corporation, payable immediately to the secretary, at the office of the company, 112 Main street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 14th day of December, 1901, will be delinquent, and advertised for sale at public auction; and, unless payment is made before, will be sold on MONDAY, the 8th day of January, 1902, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

N. F. REMINGTON, Secretary.

Office—112 Main street, San Francisco, California.

INYO MARBLE COMPANY OF CALIFORNIA.—Location of principal place of business, San Francisco, California; location of works, Inyo County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 19th day of November, 1901, an assessment (No. 35) of five (5) cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin to the secretary, at the office of the company, Room 31, tenth floor, Mills Building, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 15th day of January, 1902, will be delinquent, and advertised for sale at public auction; and, unless payment is made before, will be sold on MONDAY, the 8th day of February, 1902, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

CHARLES E. ANDERSON, Secretary.

Office—Room 31, tenth floor, Mills Building, San Francisco, California.

MARINA MARSHOANO GOLD MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Sunny Hill, Shasta County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 4th day of December, 1901, an assessment (No. 26) of four cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin to the secretary, at the office of the company, 217 Sacramento street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 6th day of January, 1902, will be delinquent, and advertised for sale at public auction; and, unless payment is made before, will be sold on MONDAY, the 27th day of January, 1902, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

CHAS. BOVONE, Secretary.

Office—217 Sacramento street, San Francisco, California.

FOR SALE.**CHAS. E. BILLIN & CO., CHICAGO, ILL.**

Solicit correspondence from parties having for sale complete

Mining, Milling, Smelting, OR OTHER PLANTS.

We will purchase for cash if in good condition.

We purchased last spring and have dismantled and resold the Diamond Hill mill, 120 stamps, vanners, water power, etc. Montana Gold Mining Co., 6 Huntington mills, power, etc.

FOR SALE.**PELTON WATER WHEEL POWER PLANT, CONSISTING OF**

Two 39-inch Pelton Wheels on same shaft, especially designed for heavy duty. Each wheel designed to generate 350 H. P. with head of 172 feet. Complete in all details—heavy floor stands, with ring oiling bearings; steel housings; steel floor beams; four throttle valves and electric governor. Plant guaranteed good as new. Ran about four months. Together with 148 feet of 42-inch double riveted steel flume.

For full information and prices, apply to

CHAS. E. BILLIN & CO., CHICAGO, ILL.**FOR SALE.**

Gold Mine, Shasta Co., Cal., partially developed; two shafts connected by drift; steam hoist; 40-stamp mill with concentrators; office, cottage, boarding house and other buildings; in fine shape to continue development work; ore smelted from \$40 to \$150 per ton; the seconds milled from \$10 to \$17 per ton; death of principal owner cause for selling; will bond to right party; price \$55,000; map and reports at our office, 189 Crocker Building.

MINING BUREAU & REAL ESTATE CO.

HOISTS.

Twenty different makes of Hoists. All rebuilt and sold under guarantee. We have the largest stock of second-hand Hoists in the West.

Send for Catalogue No. 37.

THE S. H. SUPPLY CO.,

22nd and Larimer Sts., DENVER, COLO.

FOR SALE.—HICKS 25 H. P. GASOLINE ENGINE, BATTERIES, PULLEY, ETC.

Absolutely perfect condition. Cost \$1300. Used one month. Price f. o. b. \$650. Address S. G. LINES, Room 38, 530 California St., San Francisco.

QUARTZ AND PLACER PROPERTIES in Siskiyou Co., Cal., for Sale.

Collections attended to. B. K. COLLIER, Attorney-at-Law, Etna Mills, Cal.

FOR SALE CHEAP.

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Notice—There are delinquent upon the following described stock on account of assessment (No. 4) levied on the 12th day of October, 1901, the several amounts set opposite the names of the respective shareholders, as follows:

| Names. | No. Cert. | Shares. | Amt. |
|-----------------------|-----------|---------|---------|
| J. L. Bryson..... | 99 | 1,000 | \$30 00 |
| J. L. Bryson..... | 100 | 1,000 | 81 00 |
| Myles Pickthall..... | 76 | 1,000 | 30 00 |
| Francesco Arata..... | 71 | 1,000 | 30 00 |
| F. Arata..... | 80 | 1,000 | 30 00 |
| Charles Grondona..... | 74 | 1,000 | 30 00 |
| James Grondona..... | 75 | 1,000 | 30 00 |

And in accordance with law, and an order from the Board of Directors, made on the 12th day of October, 1901, so many shares of each parcel of such stock as may be necessary, will be sold at public auction at the office of E. W. Morris, room 194, ninth floor, Crocker Building, corner of Post and Market streets, San Francisco, California, on MONDAY, the 16th day of December, 1901, at the hour of 1 o'clock P. M. of said day, to pay said delinquent assessment thereon, together with costs of advertising and expenses of sale.

EDWARD H. STEARNS, Secretary.
Office—Room 194, Crocker Building, San Francisco, California.

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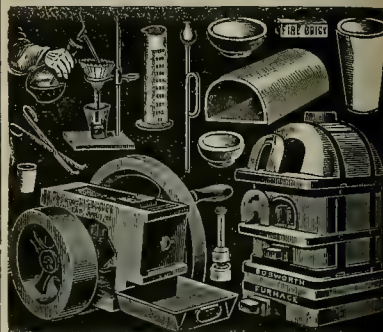
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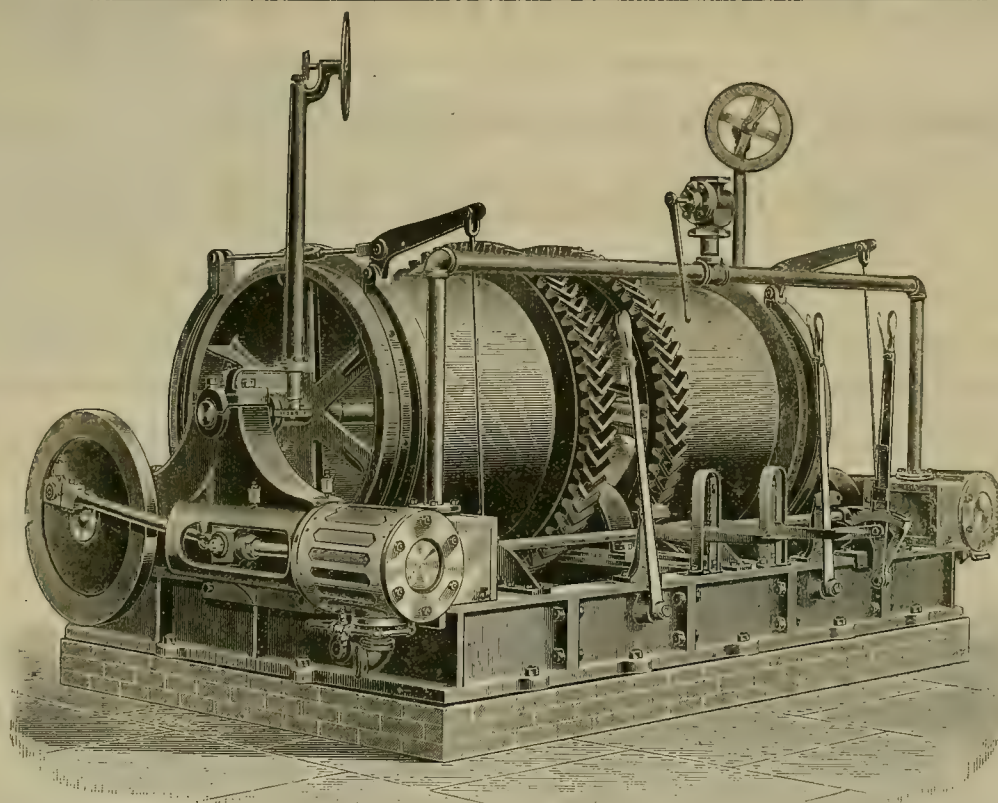
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**Mine and Mill Machinery
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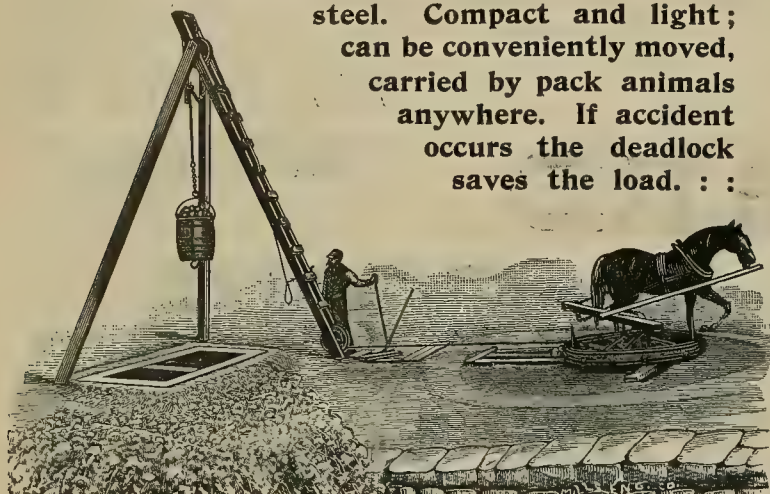
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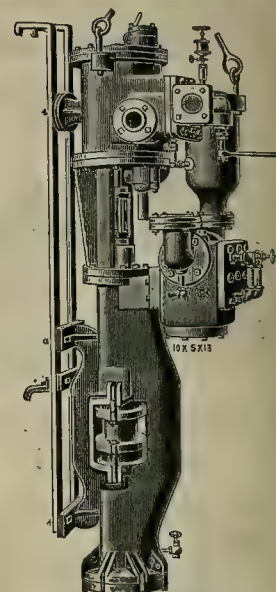
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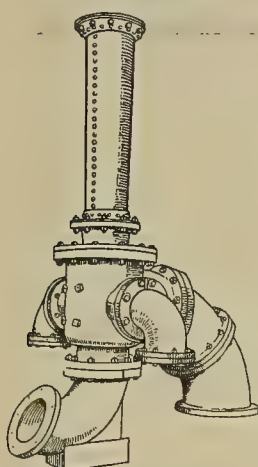
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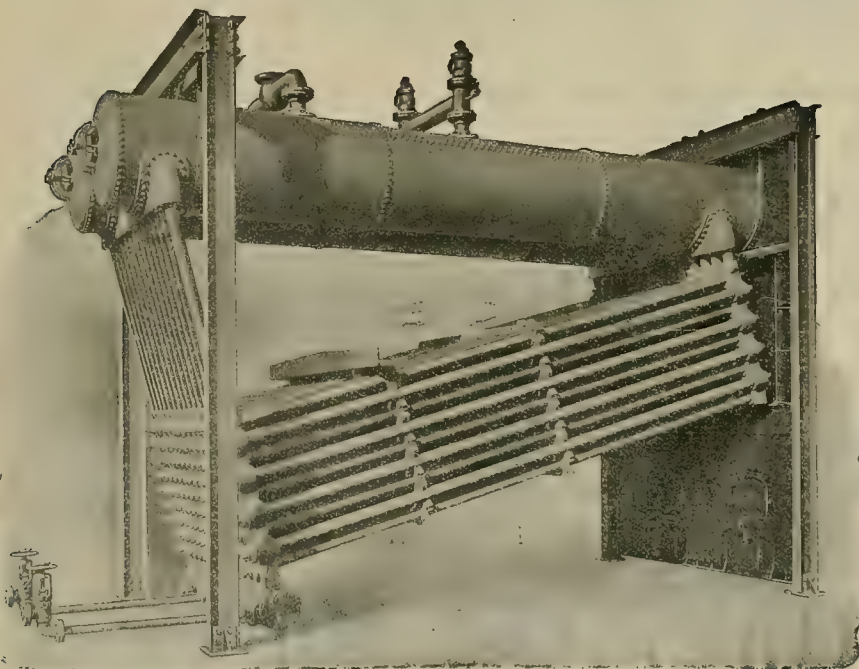
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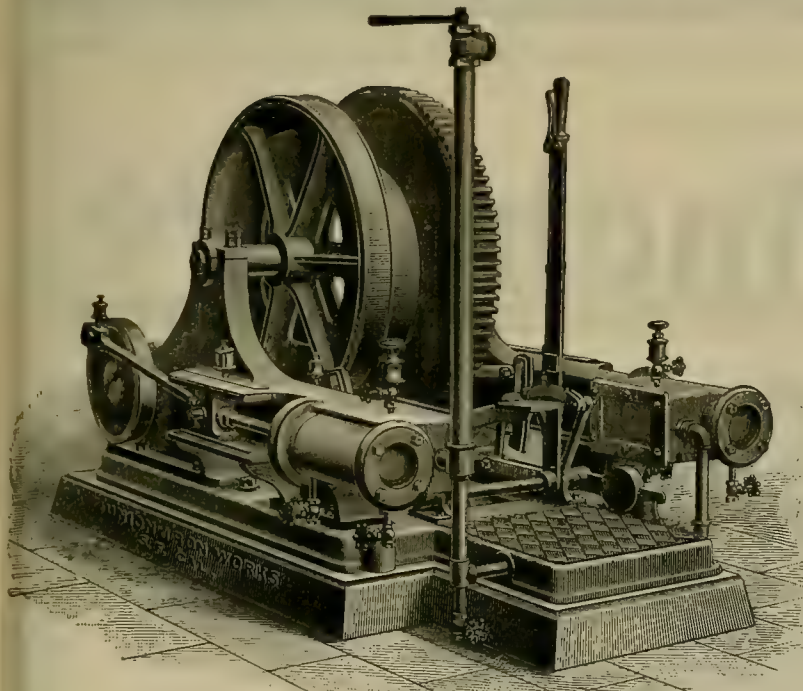
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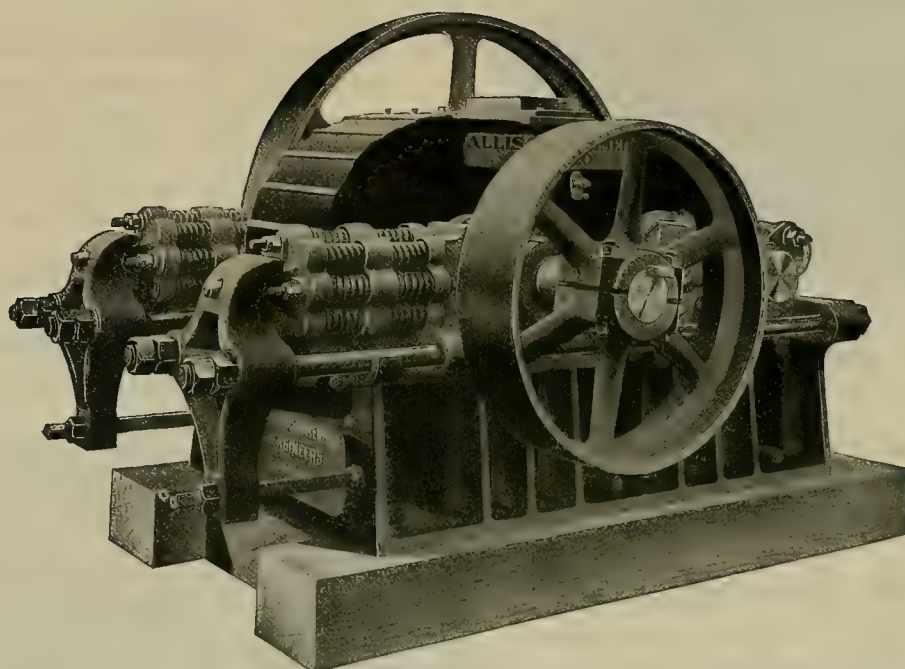
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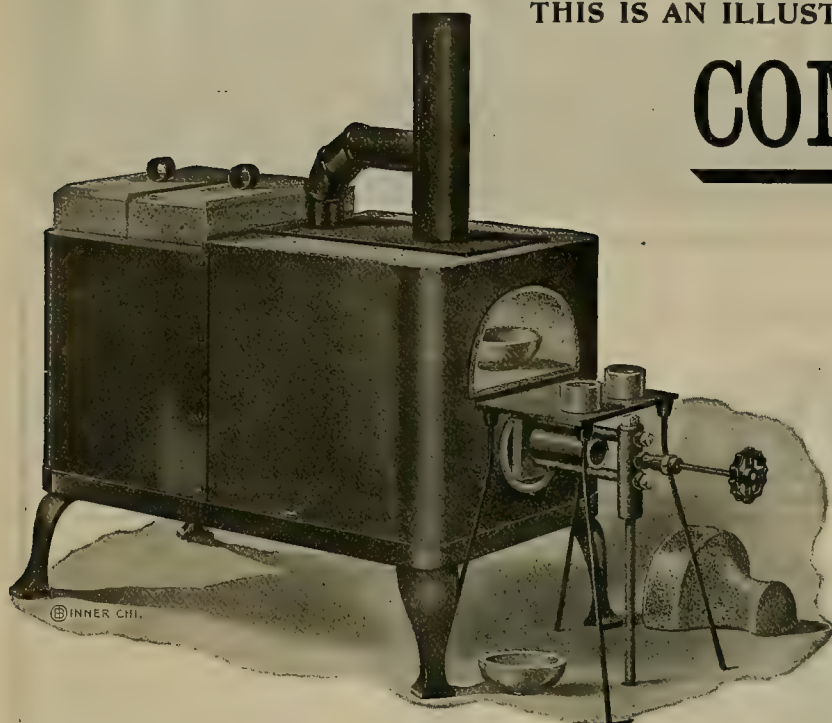


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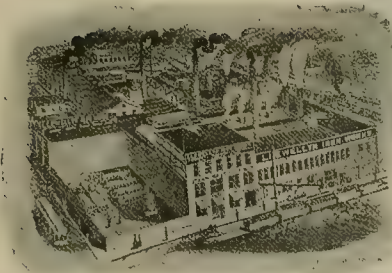
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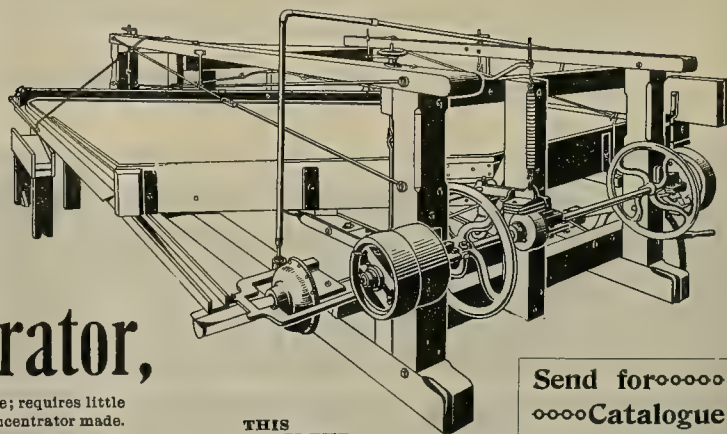
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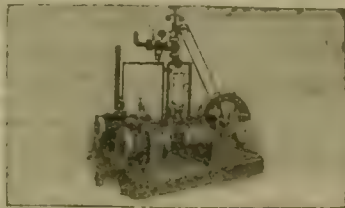
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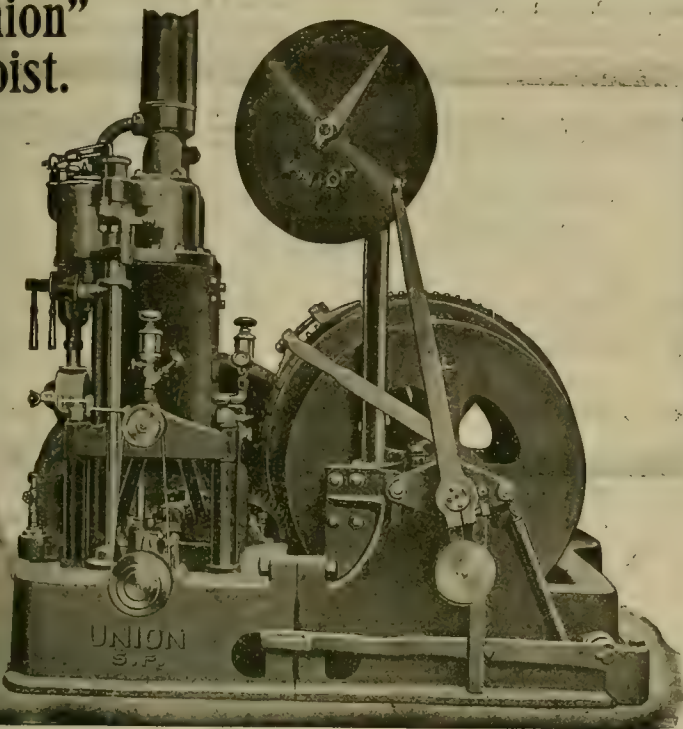
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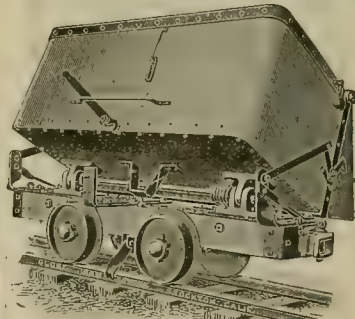
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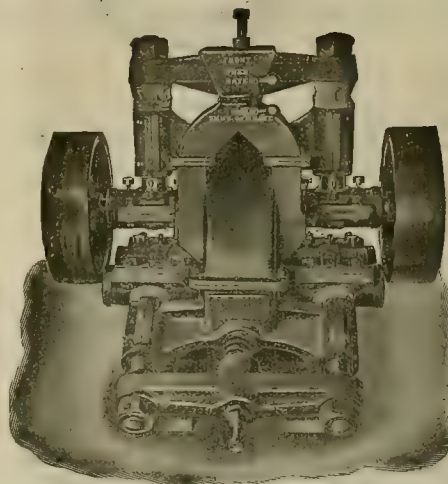
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Reduces the hardest ores, and makes best product for any treatment.

Combines best wearing qualities, economy of power and great capacity.

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Shipped as shown, ready to run.

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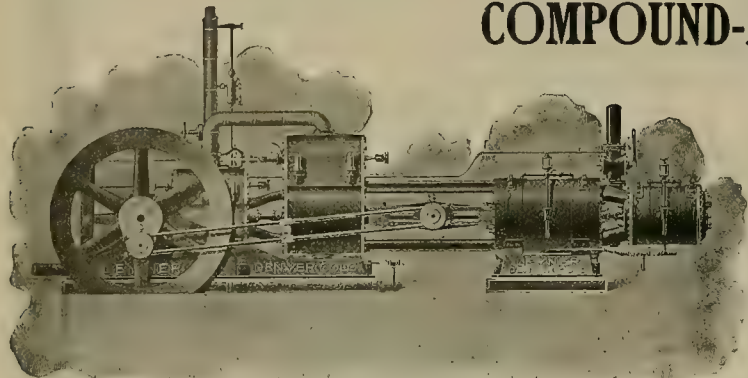
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AIR COMPRESSORS  
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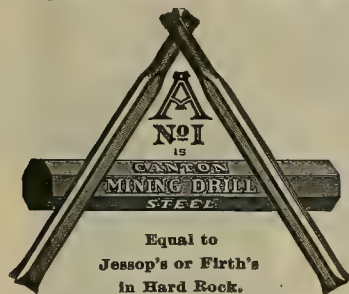
LOW PRESSURE COMPRESSORS  
FOR PNEUMATIC CYANIDE  
TREATMENT OF ORES.

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WORKS, COR. 36th AND WAZEE STS.

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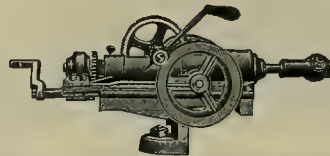


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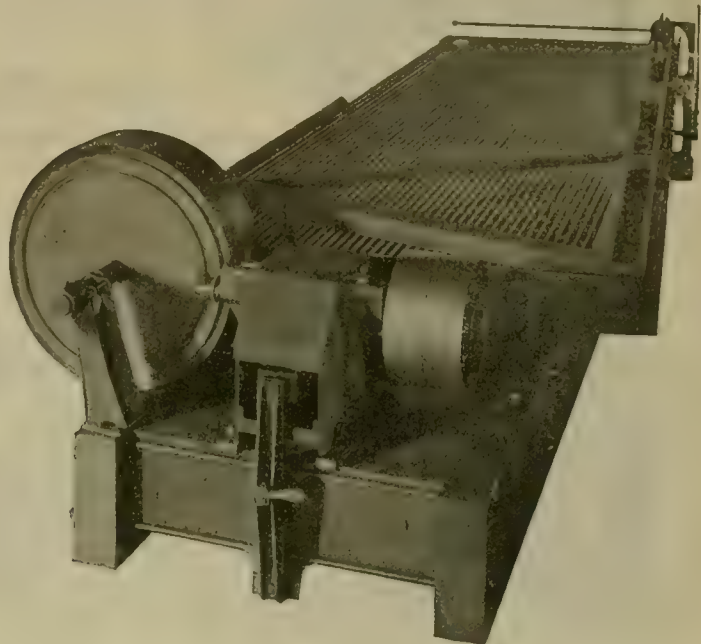
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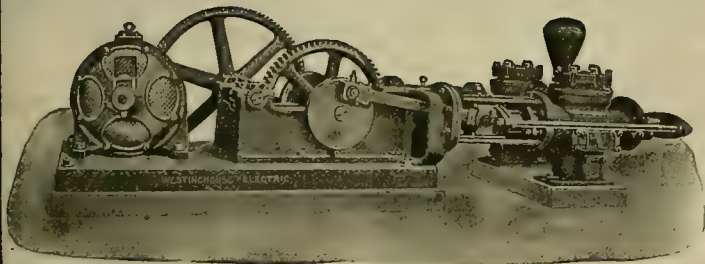
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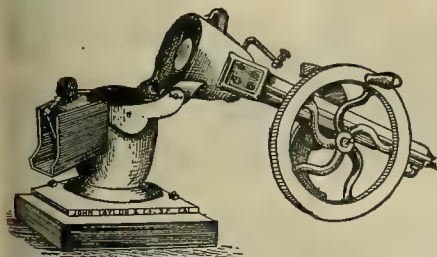
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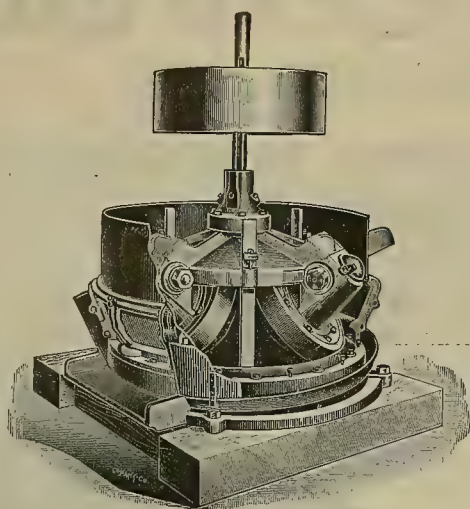
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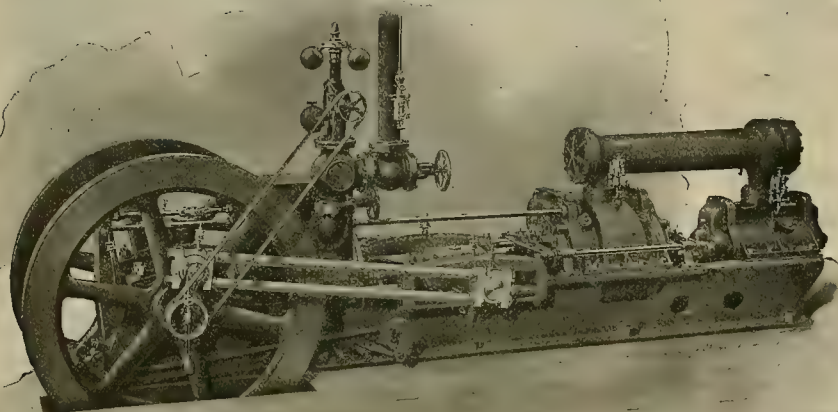
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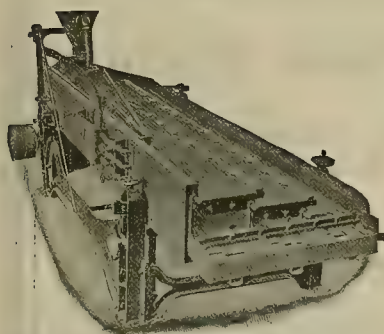
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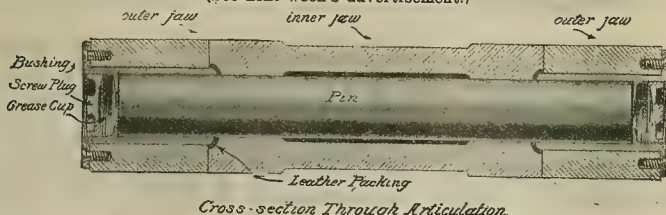
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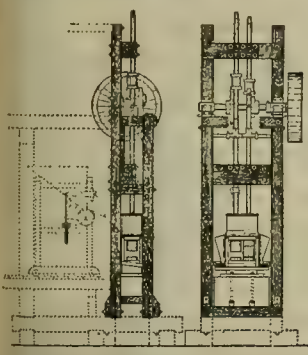
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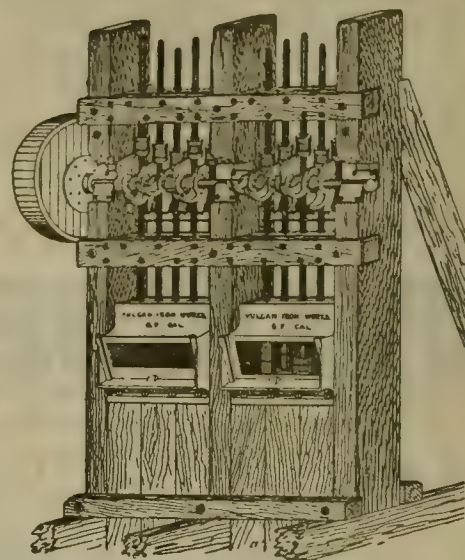
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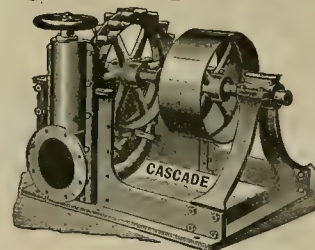


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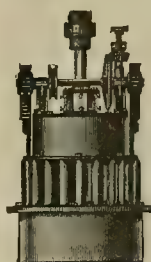
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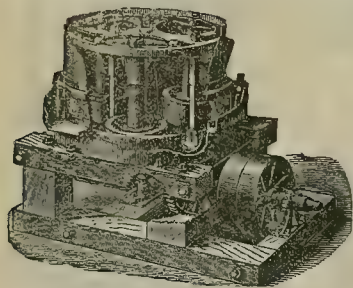
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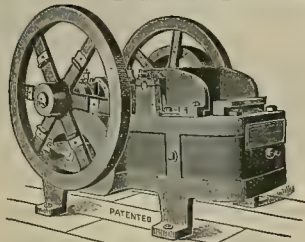
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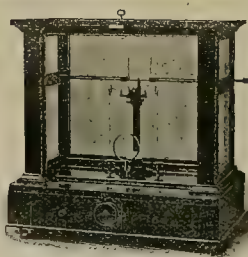
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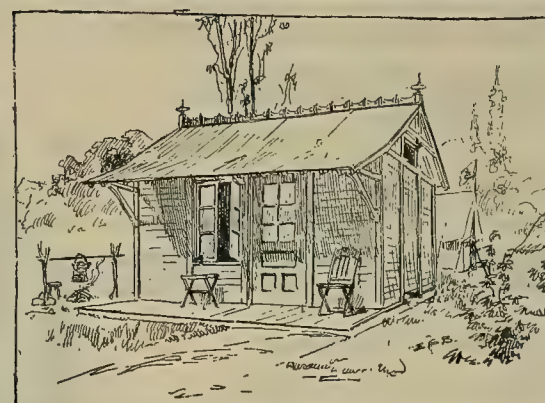
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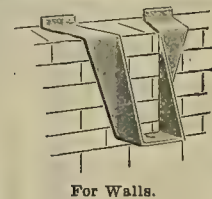
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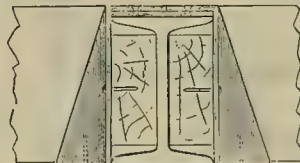


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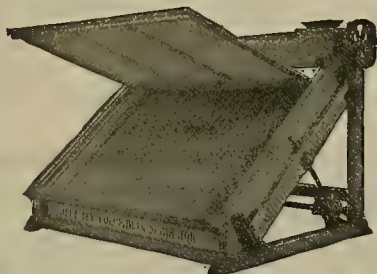
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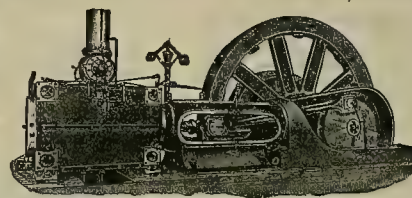
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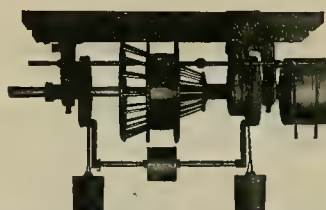
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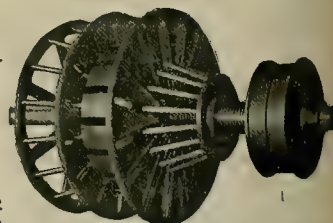
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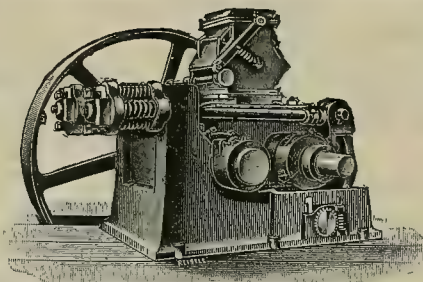
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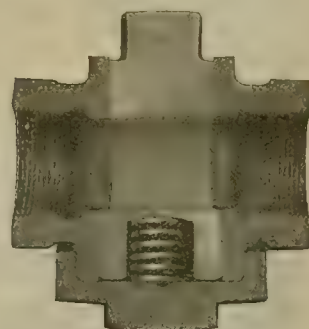
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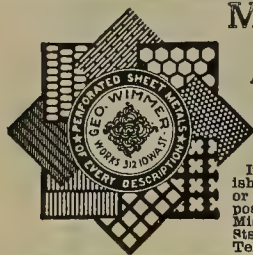






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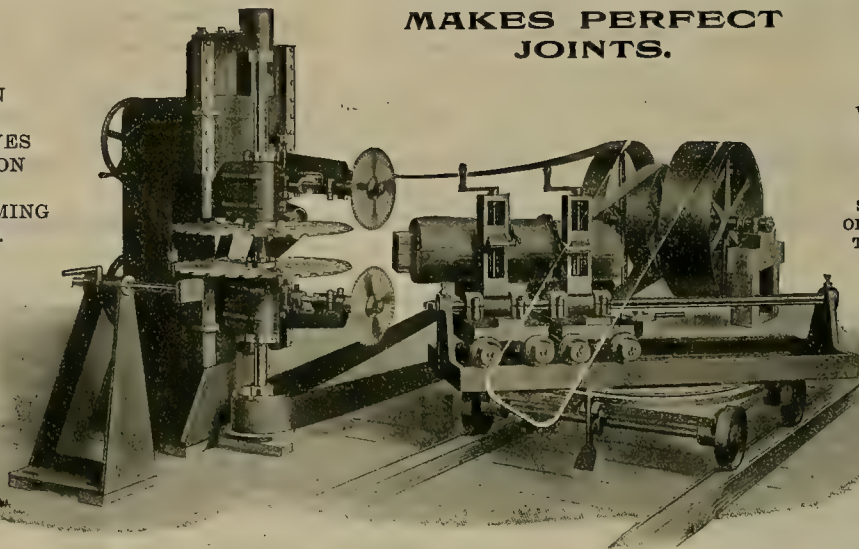
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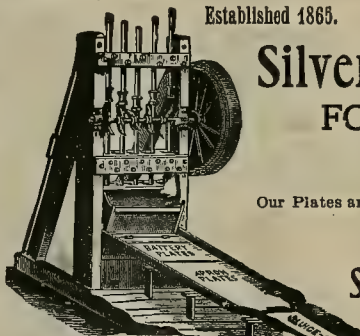
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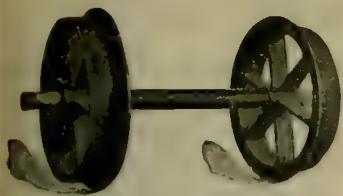
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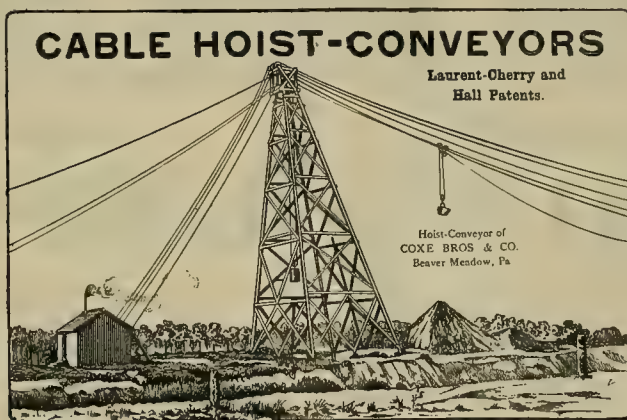
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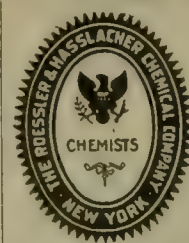
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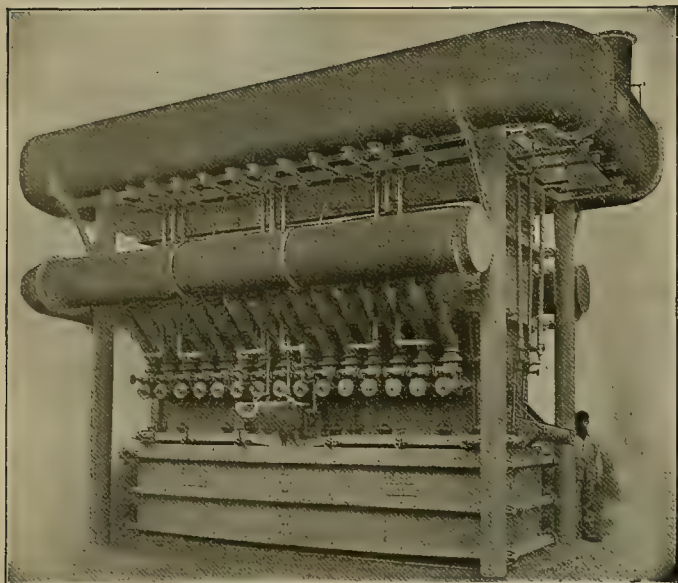
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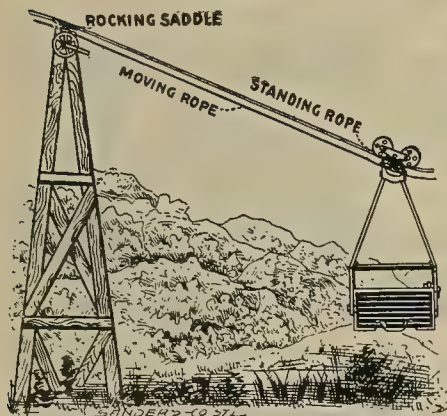
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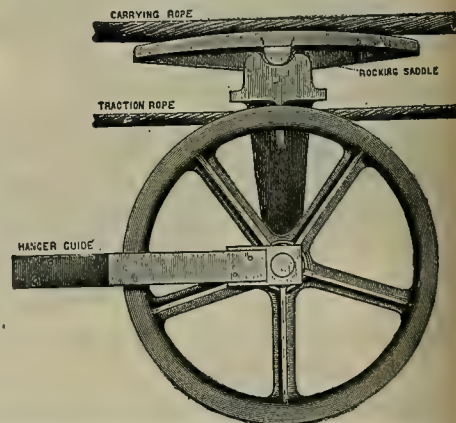
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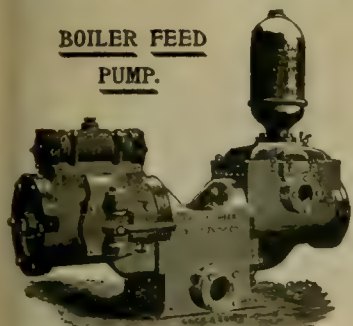
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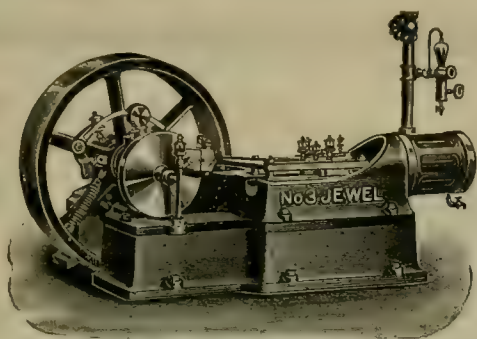
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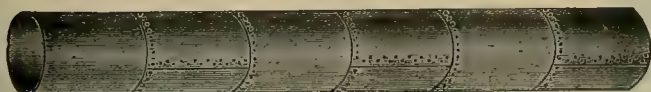
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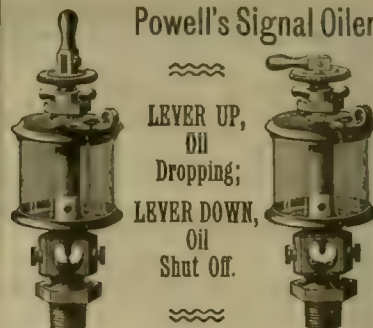
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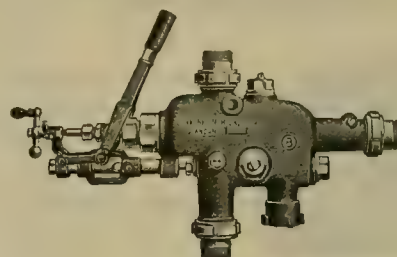
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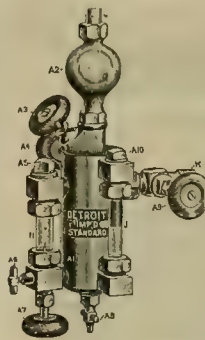
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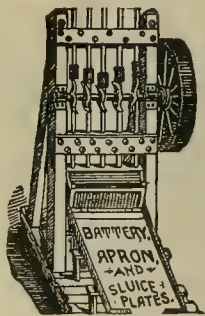
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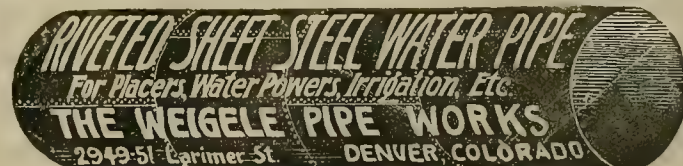


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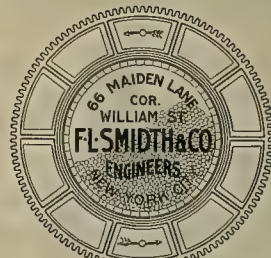




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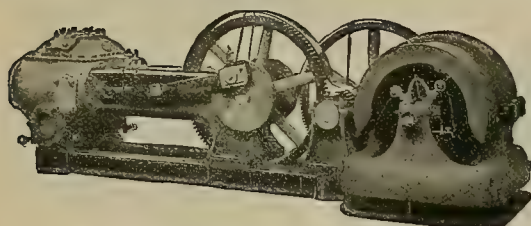
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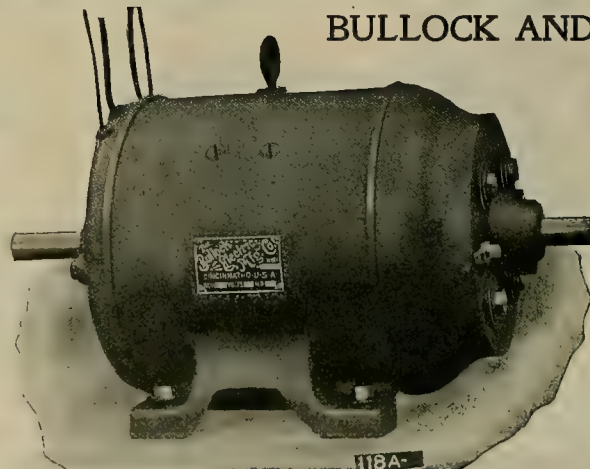
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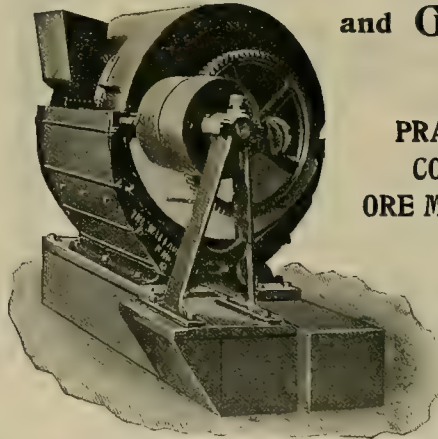
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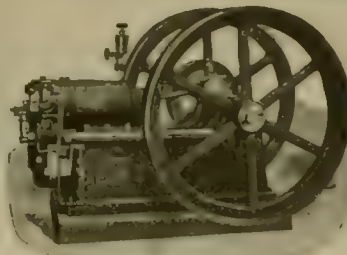


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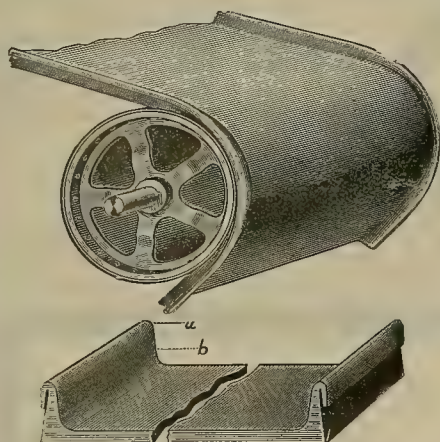


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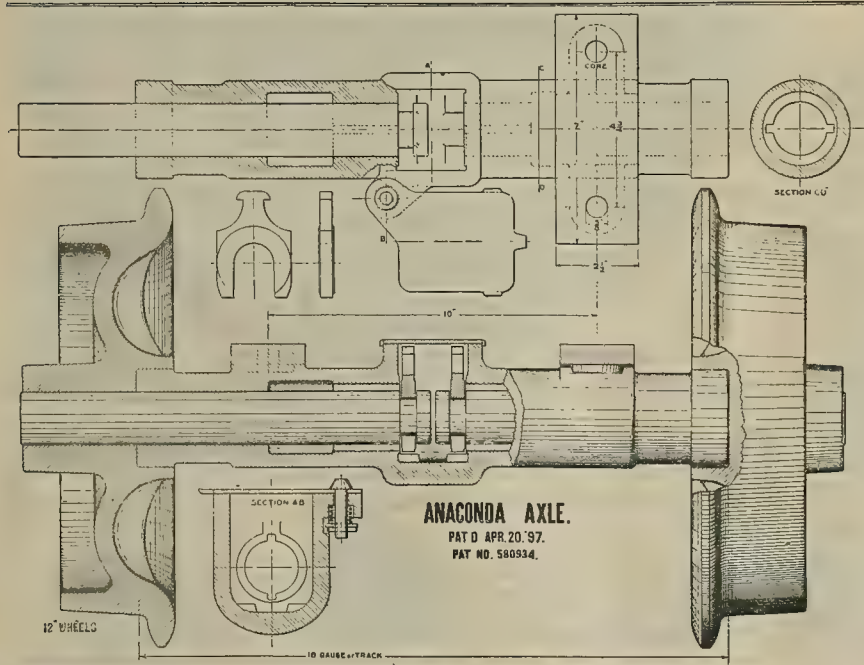
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## A New Steam or Compressed Air Stamp Mill.

For the prospector the possession of a light and serviceable prospecting mill, capable of easy transport for long distances, is a matter of prime importance.

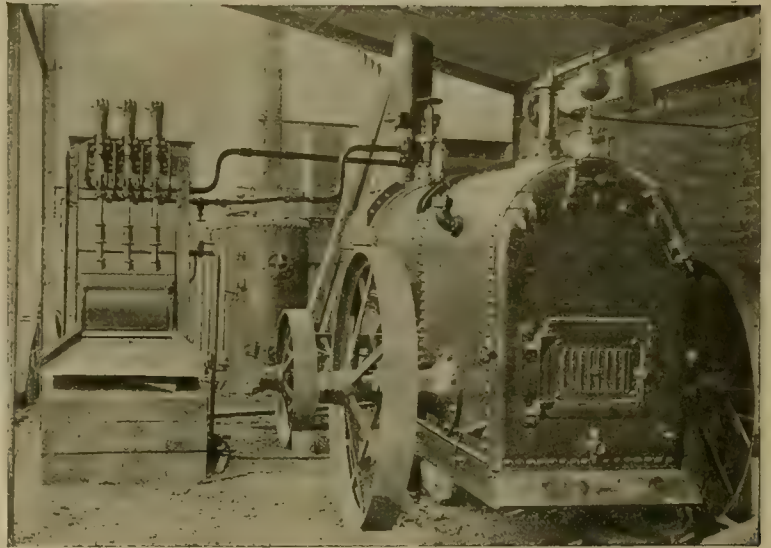
The stamp mill illustrated on this page, it is stated, will deal with four tons of quartz per twenty-four hours. A three-head machine with foundation weighs 1300 pounds. A complete plant, including boiler and accessories, copper plates, water-service tank, water raiser and connections, weighs about 5000 pounds, without road carriage. Both the stamp battery and the boiler are portable, as they are mounted on separate road wheel carriages, and the plant can be erected ready for work or dismounted for transport in a few hours. The battery and carriage cost \$1250. Some of the features in this mill are:

The large output of ore treated as compared with the weight of the mill; the high speed of the stamps, 250 blows per minute. It dispenses with a steam engine or other mechanical motors to drive, only a boiler being required. Compressed air will serve equally well; high efficiency as shown by reports obtained; low cost for maintenance and repairs, the upkeep of shoes and dies amounting to only 2 cents per ton, due to positive rotation of the stamps. There is less vibration than with gravitation mill, and heavy foundations are not required; the mill can be worked on its carriage by placing timber, packing pieces under box and taking bearing on the ground. Old mills can be converted, as in this machine the ordinary shape of mortar box is not departed from,

and the new portions can be used with mortar boxes of the recognized type. The illustration shows the three-head mill in operation, complete with locomotive boiler to drive it.

The following analysis of work done by the "A" size prospecting mill at the Coolgardie, Australia, Exhibition, 1899, shows the efficiency of the plant: Stone crushed, 50 tons; mill ran 295 hours; average, 4.07 tons per twenty-four hours; smelted gold obtained, 68 ounces 8 dwts. 3 grains; average grade of ore crushed, 1.68 ounce per ton; average extraction, by amalgamation, 88.5%; average yield per ton, 1.36 ounce. For the illustration this journal is indebted to the courtesy of Compressed Air.

LOW WORKING COSTS of mining and milling are just as desirable in the operation of a mine producing high-grade ores as in the operation of a mine producing low-grade ores. They are absolutely necessary as a commercial condition with the latter. The fact that a mine pays a large sure profit from high-grade ores should never be considered a reason for not obtaining the lowest possible working costs in the



Three Head Steam Stamp Prospecting Mill.

mining and treatment. Miners are generous people. With a good dividend paying mine the tendency is to let generosity influence the business of mining in which it is entirely out of place. There is no commercial reason for dividing the profits of a mine with other business interests simply because it is a good mine and the profits are large enough to divide. It is this policy which in its time has been responsible for as many ultimate failures of good mines, as bad management has been for the failure of bad mines.





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## The Price of Lead.

The recent conference in New York between the American S. & R. Co. and representatives of the lead mine operators of the Cœur d'Alenes, Utah, Colorado and Missouri, adjourned without any authoritative public statement of what had been agreed upon, though it was stated an agreement that was satisfactory had been made. It has been stated that the price agreed on between the parties was  $3\frac{1}{2}$  cents a pound, a reduction of half a cent. Several unconfirmed reports have stated that certain small differences in price were made as between the Cœur d'Alene mine product and that from Utah. It has been denied persistently that any immediate agreement to limit production was entered into, but this has been qualified by declarations that it was agreed to limit production if it should appear that the market was not absorbing the production at the existing rate. The statement is made that there is no present production in excess of consumption.

These declarations, some of which would appear to be optimistic from interest rather than the statement of facts, are neither luminous nor as a whole encouraging. The first clear light on the situation comes in the shape of a reduction in the New York market price of lead from 4.37 $\frac{1}{2}$  cents a pound to 4 cents. It would seem to confirm the statement of the  $3\frac{1}{2}$ -cent rate to the lead miners. The object of the cut in the New York price is stated to be the securing of an increased consumption for which a bid is made by stating that the price will be raised back to the old figure if consumption does not increase on trial of the experiment.

The difficult feature of the situation is the 40,000 tons of accumulated lead now owned by the smelting company. A mere balance between consumption and production will not relieve them of this. Only a reduction in production or increase in consumption can take this away. There hardly seems any reason to anticipate a materially increased consumption of lead. For the lead needed the price of 4.37 $\frac{1}{2}$  cents a pound has not been a restraining factor. As this journal has frequently stated, what is most urgently wanted is a new use for lead, or several uses, that will consume large quantities of the metal at prices that will pay a profit to production.

Despite optimistic views of some to the effect that

$3\frac{1}{2}$  cents a pound to the miner will not shut down any lead mine, it will probably shut down quite a number of mines. On 10% lead ore it means 50 cents a ton out of quite a small profit margin at the present price of 4 cents. With the silver price off 5 cents an ounce, the profit margin is cut from 50 cents to \$1.50 additional, and a lead silver mine which has been productive of a nice income to the operator and the community which divides his mine expense account, becomes unprofitable and has to be closed down.

Some of the large mines, the opening up and exploitation of which has been based on the theory that combination could maintain a high price for lead and silver regardless of the quantity of possible production, will feel the same pinch in net income. These may, however, have the opportunity of averaging down the loss by limiting the grade of ore mined.

The position of the smelter company is commercially better than that of the miners. Except as to the present accumulation of lead it need not make any loss on its smelting of ores for the mine operator, being, as one of its managers explained, "millers of lead ore." In a large way the smelter people are lead miners as well, and to the extent that they are, they have a commercial advantage over the other mine operators. Their ores have only to pay one profit, while the ores of other miners have to pay two, the first to the smelting people, the second to the mine operator.

Clearly with a narrowing profit margin in the business of making commercial lead it would seem as if the mine operators, now dependent on smelters, must in the end build and operate their own smelting and refining plants. How to accomplish this with many mines, no one large enough to support the type of plant which will be most economical, are matters of detail. It can be accomplished, when the business necessity of it is generally realized.

This adjustment to real condition is a matter of time. The price of lead is an affair of to-day. It is to be hoped that it will not be found necessary to establish a still lower price than  $3\frac{1}{2}$  cents. If the experience of the bad effects of combination in establishing a price that has become the incentive for an overproduction has no other cost charge but the reduction of the price to  $3\frac{1}{2}$  cents a pound, the lead miners have still some measure of good fortune.

PROBABLY nothing better illustrates the growth of the mining industry of this country than the great increase in the number of journals devoted thereto. Time was when there were but three in the entire country; this one, one in New York City, and one other. Now nearly every mining State and Territory has a strong well-edited journal whose mission it is to aid in the development of the basic industry of the nation. These journals differ in policy according to the ideas of their proprietors and the plane upon which they are run, but without reference to the openly corrupt element the most of them are earnestly striving for what they deem the best interests of the communities in which they are published. There is probably no class of trade journals among which more general harmony prevails, and while occasionally some of them energetically criticize a contemporary, it is with no other purpose than that the truth may be known and told at all times. So far as this paper is concerned it is always too much engrossed in the effort to be accurate itself to have any time or space left for noting the mistakes of others, its policy in this regard being actuated more by inclination than lack of opportunity. In all the 41 years of this paper's existence we do not remember one solitary instance of this paper criticizing any mistake of any of its contemporaries, and through the years many statements that appeared herein that at the time were contradicted and denied in contemporaneous publications, have later on been enthusiastically endorsed and defended by the same journals that at first derided and denied the facts.

THE progressive character of American metallurgy is strikingly illustrated in the case of steel manufacture. It is within the memory of men still young when the Bessemer process was hailed as the great cheapener of steel making and the creator of a new era in the world's industry. All that was said of it was deserved, but, so far as American metallurgy is

concerned, Bessemer converters are fast becoming obsolete. The process that revolutionized the steel business is being supplanted by the open hearth furnace; the continuous process is superseding the Bessemer converter.

## New Gold Mines in Old Gold Fields.

The mining summary, which appears in every number of this journal, has lately been recording the discovery of many new gold mines in the old gold fields, that it has been erroneously supposed had, to the miner of to-day, only a historical interest. This has been notably the case in the far West, in Arizona, Nevada, Oregon and California. Among these there is no favorite. Honest prospecting and good fortune have paid the same income of success in all of them. Nor has this notable character of mining development been special to these States more than to Colorado, Montana and Utah. In these three, the possible rewards to be gained by a second exploration of old districts once considered thoroughly exploited, was realized much earlier than in the States farther west. The present great mining developments of these three States, and very largely their notably great present mining districts, are the result of discoveries, beginning more than ten years ago, of new mines in old gold fields, and as well, of the discovery, that many of the old mines were in reality still new mines.

California, the oldest of the mining States, seems one of the last in time to begin the reporting of discoveries of such new mines. These new discoveries are of both placers and lodes—placer mines, that the old miners missed through supposing that the pay lead they had worked was worked out, and lode mines, where, because there were rich placer mines, it was supposed that there could not be any rich lode mines. The discovery of these mines is dissipating the belief that there were no mines to discover in these old places, and they are now being prospected for with persistence and intelligence.

The old placer gold fields of these States all originally obtained their gold from the breaking down of gold-bearing lode deposits. Unless the old placer miner actually found a gold-bearing lode in his placer working he was not likely to prospect for it. The old belief, which is by no means yet abandoned, was that the source of the gold was more apt to be distant than near by. The facts are quite the contrary, California only showing apparent—not real—exceptions, owing to the greater depth of erosion and more numerous lode systems.

The new miner does go into these old placer gold fields and in many instances finds new placers and in more instances new lodes. In some cases the lode source of the placer gold is found to have been the bedrock of the placer itself. This bedrock may, or may not, be rich enough in gold to be commercially utilizable, but this is a matter of special investigation in each case. What the miners in a general way designate as "porphyry" is a type of bedrock that it is always well to examine closely. The rock may be one of several distinct types of eruptive rocks. The gold may be in the mass of it, invisible to the naked eye, or it may be in fine, knife blade seams of quartz or lime spar, filling joint and fracture planes. Such gold-bearing rocks usually carry pyrite, which, oxidized at the surface, hides the true character of the rock and is misleading where the eye is depended on alone for conclusions as to metal-bearing value.

The preceding is one source of placer gold that may be a lode mine. Another is in near by quartz mines separated from the old placer ground by steep eroded surfaces on which placer gold in paying quantities is not collected. These ledges may be capped by soil or detrital accumulations, but their possibility is nearly always an estimable quantity by the prospector. Iron caps or gossan deposits also hide values that are close to the old placers.

So great a measure of success is attending on this character of prospecting, and mechanical appliances by which low gold values in rock are made commercially utilizable are so improved, that all the old gold fields, particularly the old placer gold fields, should be looked over for new mines. The verdict of the past as to the facts or as to commercial availability should not be regarded as conclusive. In the end it may prove that it can be said, "Once a gold mine, always a gold mine."



## Concentrates.

THE relocater of a mine can not hold the mill if it is on a separately located millsite.

PURE WATER possesses high resistance to an electric current, but the slightest acid admixture reduces such resistance.

THE total oil tankage in the Kern river, Cal., oil field, including that under construction, is said to be 1,996,000 gallons.

AN alternating current dynamo can be converted into a continuous current machine by replacing the collecting rings with a commutator.

FRICITION is the resistance occasioned to the motion of a body when pressed upon the surface of another body which does not partake of its motion.

PLATINUM occurs in the Sudbury, Ontario, mining district as sperrylite, which is a combination of platinum and arsenic found in the gossan of the Vermilion nickel mine.

A FRICTION CLUTCH COUPLING 32 inches diameter, at 100 revolutions per minute will transmit 40 H. P.; at 200 revolutions per minute, other conditions being equal, it will transmit 80 H. P.

A 6 H. P. GAS ENGINE will use about 18 cubic feet illuminating gas per hour for full load, gas and air inlet being correctly adjusted. A good governor on the gas inlet will save waste.

REGARDLESS of diameter, in the case of a pump having a 3-inch discharge pipe bushed down to 2½ inches the pressure on the valves remains the same so long as the diameter of the valves remains unchanged.

RELINQUISHMENTS can only be made before issue of patent. A deed or relinquishment of a part of a patented mining claim would not throw the part so relinquished into the unappropriated public mineral domain upon which mining claims may be located.

THE law in Colorado rightly requires that any one milling, sampling, concentrating, reducing, shipping or purchasing ore must keep a record of the shipment and all related data. Thus a check is put upon the possibility of the practice of dishonesty in connection with the shipping and treating of ore.

HIGHLY SKILLED MINERS and other workmen employed in the Johannesburg, Transvaal, mines are gradually returning. There is a demand for more of them than have yet gone back. The Government is still limiting the number that are permitted to return, but is rapidly removing the restrictions.

THE quantity of sodium delivered to the sea every year by rivers is about 160,000,000 tons; but the quantity of sodium which the sea contains is at least ninety millions of times greater than this. The period of time during which rivers have been carrying sodium into the sea must therefore be about ninety millions of years.

SEAMLESS TUBING is made by subjecting a solid steel rod to a rotary motion under heavy pressure produced by several rollers, the axes of which are set at an acute angle with the axis of the steel rod. The center fiber is opened, making a hole into which a mandrel is inserted, which will expand the opening and make it of uniform circular diameter.

THE Supreme Court of Pennsylvania, in a case against the Lehigh Coal & Navigation Co. for discharging mine waste into a stream on which the plaintiff had a water power mill, has affirmed a judgment for damages and a permanent injunction given by the trial court. The decision, which the court bases on the Pennsylvania statutes and the common law, is regarded as establishing the rule for that State.

FERRO-CHROMIUM is commercially manufactured from chrome iron ore in an electric furnace. Cheap water power is desirable. All the chrome iron ore now handled in the United States in the production of ferro-chromium is imported from Turkey. The California ore might displace it if it was manufactured into ferro-chromium on the ground and the cost of transportation of useless matter was thereby saved.

ONE who buys mining stocks should know the capitalization of the company and the proportion the stock he buys bears to the total capitalization. A large number of shares may be so insignificant a fraction of the total capitalization that the sum paid for the stock is out of proportion to what is bought with it. A corporation with \$50,000,000 of capitalization on paper and no real property assets is not likely to prove a paying investment.

A "BAG HOUSE" in connection with a smelter is a large building through which pass all the smoke and gases on their way to the stack. The building is lined with large wooden "bags," and the fumes pass through these bags, saving all the fine particles of gold and silver. The American Smelting & Refining Co.'s "bag house" at East Helena, Montana, saves \$25,000 annually of metallic values that otherwise would pass away in the smoke.

A CHEMIST and a laboratory are now necessary adjuncts of many manufacturing businesses. It pays to have such scientific appliances. Take, for instance, a large brass foundry buying thirty tons of copper per month. The chemist would earn a good part of his salary were he to show that the purchased copper contained, say, 1½% zinc. Of course, zinc would be added

anyhow to make the brass alloy, but the difference between thirty tons of copper per month, of pure metal, and thirty tons with 1½% zinc would represent in New York over \$1500 annually. And so it is in other metallurgical operations.

AMONG the advantages of electrical over mechanical transmission are the ability to shut down departments without interfering with the main power transmission; the ability to arrange machinery regardless of the lines of the building, thus obtaining efficient grouping and effective lighting; freedom from shut down caused by breaking of main belts; lessening fire risk by abolition of vertical openings through floors, made necessary by vertical belts; instantaneous response to sudden demands for power, and the ease with which additions can be made.

WHEN silver is immersed in mercury there is produced at the surface of the former metal an extremely thin layer or film of amalgam which arrests the ulterior action of the mercury. This is believed to be the reason why grinding is so requisite in the amalgamation of silver ores, as the adherent coating of amalgam is removed by the friction, fresh surfaces of silver being exposed to the mercury. In like manner, clean siliceous sand assists amalgamation, while clay or any other substance which increases the viscosity of the pasty mixture hinders the amalgamation.

TO TEST quantitatively for the presence of gold and silver in the solutions with potassium cyanide as a solvent at any stage of treatment, take 500 cubic centimeters of solution, heat nearly to boiling point, add two grams sulphate of copper and two grams sodium sulphide; add hydrochloric acid so as to have a strong acidity; heat to boiling point; filter the black precipitate in which the gold and silver are retained; scorch the precipitate with fifty grams litharge. The gold and silver are recovered from the lead by cupellation. The sodium sulphide used in this test may be made by fusing in a crucible one part of carbonate of soda and one part of sulphur. The crucible must be well covered.

MECHANICAL FORMULAS relating to the strength of materials and the strains and stresses to which use subjects structures, are not absolute. They are largely compromises. In their application a margin is always provided to protect structures built in conformity with them. This is called the factor of safety. Better knowledge and better methods are tending to make this factor less a matter of guessing. One use of it is, for example, to provide for the deterioration of metal which in time uses up the safety margin. To limit this, investigation is being made, both to reduce the rate of deterioration and to determine what that rate is. To structures then, on which only static strains come, a much lower factor of safety will be a safe factor, and it becomes possible to save material and its cost.

FULL PAID STOCK is stock for which the company has received full value at the time it is issued. The term has no relation to the market price. The law contemplates that stock may be paid for in installments, and when the last installment is paid, it is full paid. Under the practice in Colorado, the stock is frequently issued full paid in payment for property conveyed to the company in consideration for the issue of stock, and to the value thereof. Assessable stock is stock, the holder of which is liable to pay assessments levied by the company and upon non-payment of such assessment properly levied, the stock may be, by proper procedure, sold to pay the assessment. Non-assessable stock is stock against which the company cannot levy assessments. The stock of any California corporation is subject to assessments.

Any person who makes the required deposit to the credit of the Treasurer of the United States for office work in the office of the United States Surveyor General and files in that office a certified copy of his location notice, with his application for survey and certificate of deposit, can procure an order for the survey of his claim, and the surveyor appointed to make the survey will be required to certify in the field notes of the survey that a mineral-bearing lode or vein exists. It would not be possible to have the survey approved unless evidence showing this to be a fact is presented to the Surveyor General, and unless the deputy surveyor reports that at least \$500 has been expended in labor and improvements. If the report of the deputy surveyor is not sustained by the facts in the case, the proper course to pursue is to attack the claimant's application for patent.

TO case-harden steel with cyanide of potassium, the piece or part of steel to be hardened is first coated with a protecting mass that is able to resist the heat, and thereafter cyanide of potassium is strewn upon that coating, whereupon the whole is put into the fire. The piece thus treated is then quenched. Instead of using only cyanide of potassium some use a mixture of this substance with coarse salt. By treating the steel in this manner is obtained in the same way a uniform structure, which is not changed when the steel is cooled down. This feature is particularly important in the case of machine parts and the like. The coating consists generally of purified chalk and varnish; but the chalk may be replaced by clay, oxide of zinc, and other substances that do not burn down in the fire. The oxide of zinc may be mixed with file shavings of lead, when a solid crust will be obtained, resulting from the melting of the lead. When the steel to be hardened, after having been coated with the protecting mass, is heated, together with this mass, the varnish, that merely forms a kind of a cement-

ing medium, burns and a hard, porous cover remains. During the further heating of the steel with this hard, porous cover, the cyanide of potassium strewn upon that cover passes into and through the pores of the latter and distributes its action uniformly upon the surface of the steel. When using a mixture of cyanide of potassium and coarse salt, both substances are employed in equal quantities, the quantity of the whole mixture being, of course, dependent upon the size of the pieces or parts of steel to be hardened, or of the extension of the surfaces of same, respectively.

A CO-OWNER in a mining location can not lawfully prevent the other co-owners from doing the annual assessment work required by law. If he has himself performed the assessment work it protects the claim from forfeiture regardless of whether or not the other co-owners do any assessment work. If he has not done the assessment work and he, by force or otherwise, prevents the other co-owners from performing the work the claim becomes forfeit. The remedy of the ousted co-owners is through the courts by a restraining order directed to the opposing co-owner to keep him from interfering with the others doing the work. A co-owner representing to the other co-owners that the assessment work had been performed, whereas it had not, can not, when the claim becomes forfeit, relocate it, either directly or through a third party, for his sole use and benefit. Any such relocation inures to the joint benefit of all the co-owners.

WHILE we know that the earth is a magnet, no one is able to say what makes it so. The fundamental secret of terrestrial magnetism has not been solved. Then, too, there are various changes in direction which mark the behavior of the needle that remain to be explained. These questions are often asked: "What influence is it that makes the needle swing to and fro to a microscopic extent every day? Why is it that the diurnal swing is greater in years of sun spot abundance than at the minimum stage of solar activity? Why do the indications of the needle differ in summer from those of winter? What is the key to the mystery of the long period movement that makes it necessary to rechart the situation? What causes the convulsive behavior of the magnets for a few hours or days when there is a great out-break of sun spots? And is there any relation between the weather and the fluctuations in the earth's magnetism?" There are theories on these subjects, but no generally accepted doctrines, but the human mind is so constituted that it will not rest until further light is obtained.

THE U. S. Mint gives in exchange gold coin for gold bullion, no charge being made for the coinage of the bullion; but a charge is made for the copper added in making an alloy of the proper standard, or 900 fine, that being the fineness of both gold and silver coin. All unrefined gold bullion, unless it be foreign coin, must be refined or parted, for which a charge is made in accordance with the fineness of the metal. Upon fine gold—that is, bullion over 990 fine in gold—no parting or refining charge is made. Seigniorage is the actual difference between the face value of the coin and the market price of the metal in the coin. As the market price of the gold in a gold coin equals its face value, there is no seigniorage upon the coinage of gold. In all U. S. silver coins it is different. In the silver dollar, containing 412½ grains of metal, 371½ grains of which is pure silver, if the market price of an ounce (480 grains) of silver is 60 cents, and the Government puts in the dollar 371½ grains of silver, then the difference between the market value of 371½ grains of silver and the amount of silver which the dollar will purchase is the seigniorage.

THE accumulation of amalgam on copper plates, like other mill matters, is largely resultant from the ore treated. In the case of some sulphide ores the amalgam has a tendency to form hard scale on the plates, which cannot be removed with a rubber scraper, whisk broom or any such tool. But with a steel scraper the scale can be broken through and cracked off like a layer of dry putty, and this, if done properly, leaves the plate with a soft and satiny amalgam surface, if anything, better, for catching gold, than the uneven surface of harder-scaled amalgam. The use of the steel scraper is necessary with inside plates, where the scouring of the heavy mineralized pulp seems to harden all the amalgam. Amalgam which forms hard scale on the plates yields bullion finer in gold and lower in silver than the softer variety, and it is generally obtained from ores carrying comparatively coarse or flaky gold. Possibly only the coarser gold tends to form hard amalgam scale on copper plates, so that while in some ore the native silver is the coarser, in other instances, where native silver is almost unknown, scale can only form from ores carrying coarse gold. The increasing proportion of silver to gold in the amalgam caught farthest from the battery is of common occurrence. The old plates should be thoroughly scoured for several hours with sharp sand from the tailings, hot water and quicksilver. The loosened amalgam could then be removed (after washing off the sand with hot water) with a rubber scraper in the ordinary way, leaving the plate with a good, soft surface of amalgam, in excellent condition for further use. Considerable difference lies in the mode of cleaning the plates, and especially in the use of the steel scraper. This tool can be used so as to ruin any plate, but in proper hands it is indispensable to the millman. The scrapers used in the district around Central City, Colo., are made from 1½ inch steel, about 3 inches wide, ground square across, so as to give two right-angled edges.



## Some Principles Controlling the Deposition of Ores.\*

By C. R. VAN HISE

This paper is intended as the closing reply to comments on the author's previous papers on the same subject. It appears that, so far as the classes of ore deposits are concerned, there is no difference of opinion between myself and Prof. Vogt and Dr. Lindgren. We all agree that the class of contact deposits exists; that the source of the ores of such deposits is largely the igneous rocks; and that during the concentration of the ores a high temperature prevailed. The difference of opinion occurs in the interpretation of particular cases. Prof. Vogt and Dr. Lindgren, but more especially the former, hold that many ore deposits, including sulphides, are more closely allied to the igneous rocks than to water deposits, while I hold that the majority of ores, as shown by their character and relations, are deposited by underground waters. However, I have distinctly recognized that there may be deposits in which it is difficult to say which of these two agencies predominate.

But in the vast majority of cases there is little difficulty in discriminating between veins and dikes, the first representing crystallizations from water solutions, the second crystallizations from magma. There are few cases where the discrimination with reference to ore deposits is not easy. While gradations between water-deposited ores and igneous ores are uncommon, gradations between the different classes of ore deposits formed by underground water are common.

Concerning pneumatolitic action as an auxiliary in the formation of ores, as held by Vogt, Lindgren, Beck and Kemp, I do not deny the existence of ores of this class, but simply say that, while ore deposits produced by this process are theoretically possible (and very likely exist) I do not know of any instance in which it has been shown that pneumatolitic action has actually been a dominating factor in the production of a workable ore deposit. However, I think it not unlikely that pneumatolitic action (in the sense of water gas under very high pressure, above the critical temperature of water) may have helped in the segregation of the metals by transporting them to the main channels of water circulation. This condition of the water I distinctly recognize as producible not only by igneous rocks, but also by dynamic action. But discrimination should be made between what may be true and what has been shown to be true. The presence of such so-called contact minerals as tourmaline and fluorite, holding such elements as boron and fluorine, is not proof that they and the other minerals in the veins containing them were not deposited by heated circulating waters.

From the proposition that igneous rocks are an important source of the ores, and that the ores are extracted from them by circulating waters, it by no means necessarily follows that this work is chiefly done while the rock is a fused liquid mass. After the rocks crystallize and become partly cooled, deformation and the cooling itself may produce many fractures in them, thus furnishing channels through which the hot waters course while they are collecting the metals. In this manner is largely explained the difficulty under which Prof. Kemp labors in understanding how circulating waters may work upon hot igneous rocks. So far as igneous rocks are deep-seated intrusives, they may retain after crystallization a very large part of the water which they previously held. This is evidenced by the innumerable liquid inclusions in many such rocks.

In this connection I may say that, among the papers presented in this discussion, Lindgren's admirable paper upon metasomatic processes in fissure veins seem to me wholly to confirm the view that the deposition of most metallic deposits is effected by underground water. The metasomatic changes in the rocks which Dr. Lindgren describes occur not only in the veins themselves, but in the walls of the veins. Moreover, in many cases the amount of change decreases in passing from the walls into the veins. During the metasomatic changes metals were added and subtracted. Lindgren declares that, in the great majority of these cases, the chief agents through which the metasomatic changes were accomplished were circulating waters. He concludes, further, that the waters were probably hot; that those which originally deposited the sulphide constituents were probably ascending; but that the ascending waters are chiefly of surface origin. Therefore, in all these matters, by his exhaustive study of the metasomatic processes in the veins, Dr. Lindgren fully confirms my most fundamental contentions.

It is noteworthy that Prof. Vogt and Dr. Lindgren, with admirable scientific restraint, notwithstanding the beliefs which they hold, discriminate clearly between the few cases in which they have shown a probability that the ores are the products of igneous action and the far more numerous cases in which the evidence of such origin is very scanty or wanting altogether.

Thus Prof. Vogt recognizes clearly that the attribution of the larger class of these ores to igneous

action is purely hypothetical. He fully appreciates that, of the great majority of ore deposits, he has wholly failed to show that igneous agencies have separated the ores from the original rocks and placed them in their present positions. This connection must be made before the hypothesis advanced by Prof. Vogt can hope for acceptance. Since the majority of the ore deposits thought by Prof. Vogt to be possibly due to "contact after action" in some other sense than segregation by underground water differ in no essential particulars as to their character, the minerals they contain, the relations of these minerals to one another, the relations of the ores and minerals to the surrounding rocks, the presence of crustification, and other features, from ore deposits which many authorities, including Prof. Vogt, recognize as deposited by underground water, I shall hold to the old view that they are the results of water deposition until evidence is presented showing the contrary. To attempt to prove the proposition that these ores are deposited by water would require the repetition throughout of the arguments for such an origin which have been presented during the past half century by nearly all of the famous men who have discussed ore deposits. If these arguments are not adequate to convince the reader, I cannot, in closing this discussion, present the case more fully, but must defer the matter until the publication of my treatise upon "Metamorphism," in which I consider much more fully the circulation and work of underground water, and the character of the deposits produced by that agent.

If it be recognized that, in the majority of the cases cited by Vogt and Lindgren, the materials of the ores were transported and deposited in their present positions by underground waters, it makes no difference to me whether such ore deposits be called contact deposits, hydro-thermal deposits, dynamic metamorphic deposits, or regional metamorphic deposits, as proposed by Lindgren.

Dynamic action may increase the temperature of the underground waters, and make the conditions much more favorable for the deposition of ores. If in the first part of my paper, discussing general principles, I have not made clear my belief in the extreme efficiency of hot water, as compared with that of cold water, in the segregation of ores, I have failed altogether to convey my ideas. I fully recognize the remarkable relative potency of hot water in all classes of alterations of rocks, including the deposition of ores. I emphasize especially the effect of high temperature, (1) producing a deeper circulation, (2) in producing a more rapid circulation, and (3) in very greatly increasing the power of water to do chemical work of all kinds.

Further, I strongly make the point that both the speed of solution and the amount of material which may be taken into solution are greatly increased by high temperature, and in proof of the efficacy of hot water in the production of ore deposits, I cite the Cordilleran region of the West as one in which the temperature of the water is higher than normal, and in which ore deposits are common.

In conclusion as to this portion of the discussion, I would say that, while I think I have given adequate weight to igneous rocks as a source of the ores, and to the resultant hot waters as an agency in their concentration, I have not elaborated that branch of the subject. The reason is, that these ideas are not new, but have been generally accepted for decades by all who have written upon ore deposits. A complete treatise upon ore deposits should, of course, give proportional representation to all parts of the subject; but a paper on the subject necessarily covers the new ground most fully; and if, in addition to this, it puts new material in proper relations and proportions to old material, that is all that can be fairly expected.

I have reserved for separate consideration most of the points raised in Prof. Kemp's paper upon "The Role of the Igneous Rocks in the Formation of Veins," with the arguments and conclusions of which I am not in such general agreement as with those of the other papers named. I shall state the points both of agreement and of difference between us; and, I need hardly say, with entire personal esteem and respect for Prof. Kemp. But my position is rendered somewhat embarrassing by the circumstances that this contribution closes the discussion, so far as it is to be published by the Institute in the special volume now in press.

1. From the frequent occurrence of ore bodies in regions of vulcanism, it does not follow, as held by Prof. Kemp, that the igneous rocks are the sole source, or, in some cases, even an important source of the ores. As pointed out by Prof. Le Conte many years ago, and as shown by me, "the undoubted occurrence of workable ore deposits in regions of vulcanism may be explained by that heat furnished by the igneous rocks, this promoting the work of the underground solution." I have already emphasized the enormously increased activity of solutions with rise of temperature. In the neighborhood of igneous rocks the underground solutions are hot, and these hot solutions may, and in many cases, I believe, undoubtedly do, derive a large part of their metallic material from the sedimentary or metamorphosed rocks, although, as indicated in my original paper, I maintain that probably the ultimate source of all the

ores, and very frequently the chief or sole immediate source, has been the igneous rocks.

2. While Prof. Kemp would derive the majority of ores from igneous rocks, he declares that surface flows of such rocks are unfavorable to vein formation. But, to give a single instance to the contrary, the Lake Superior copper deposits were shown by Pumpelly, years ago, to occur in or associated with surface volcanic rocks. I think the true statement is, that very recent volcanic flows have not had time enough for the development of contained or connected ore deposits; or else, they have not been eroded deeply enough to expose such deposits, if they exist. But it would be rash to say that ore deposits are not even now forming in the middle and lower parts of the great lava flows of the plateaus of the West. Indeed, I think it highly probable that such formations are going on, and that at some future period the resulting ore deposits will be at the surface.

3. In asserting the existence of gradations between pegmatite and quartz veins, I am glad to find Prof. Kemp in full accord with me. I pointed out such gradations some years ago, and, as already explained, advanced as the explanation that water and rock, at sufficiently high temperatures and pressures, are miscible in proportions.

4. From Prof. Kemp's statement that "practically all students of volcanic phenomena are agreed that steam and its dissociated representatives in the molten rocks are the chief, if not the only, cause of eruption," I must wholly dissent, holding with Dutton and Gilbert that, in areas of regional vulcanism (which are those containing the most extensive ore deposits), gravitative stress is the dominant force producing eruption, although it is agreed that steam plays a subordinate part, and an important part in local vulcanism.

5. Perhaps I do not fully appreciate Prof. Kemp's arguments concerning capillary attraction as connected with the movements of underground water. Prof. Kemp says that the imperviousness of strata is partly due to the "feebleness or disappearance of capillary attraction with increase of pressure." Later he says: "Whenever, for example, capillary transmission occurs, the previously acquired head is lost, and the emerging water proceeds on its way only under a newly accumulating head." Further, he says that "capillary attraction is largely an ascensive force." I am uncertain whether or not Prof. Kemp intends to imply that I have advocated the view that capillarity is an important force, which accounts for the circulation of groundwater in the belt of saturation. As a matter of fact, I have not appealed to the force of capillarity in any way whatever to explain the circulation in this belt. It seems to me that Prof. Kemp has wholly failed to recognize the great difference in the nature and forces which control the circulation of water in the belt of weathering, above the level of ground water, and the belt of cementation, below that level. Above the level of groundwater the force of capillarity is important in the movement of groundwater. This matter I shall discuss fully in my treatise on Metamorphism, but cannot take up here, as it is a complicated one. Below the level of groundwater, the size of the openings, as I have fully explained, is of very great importance in the movement of the underground water, because friction runs up very rapidly with subdivision of the openings; but how capillarity is a "descensive" or "ascensive" force in this belt, I am at a loss to understand.

6. Prof. Kemp does an unintentional injustice when he cites me as supporting "the views that hot springs are the result of normal terrestrial circulations, without accessions of heat other than those which would be received through the ordinary increase of temperature with depth." I refer the increase of temperature of the underground waters to the normal increase of temperature with depth, to vulcanism, and to dynamic action. Regional vulcanism and orogenic movements I mention twice as producing high temperature.

7. But I held, and still hold, that difference in temperature of the ascending and descending columns is a cause which works in the promotion of circulation as an adjunct to the main cause, heat. Prof. Kemp argues against this conclusion, but his argument seems to me to be unsound, for the following reasons: a. Since I emphasize vulcanism and orogenic movements as chief causes of high temperature in underground water, the depth, and therefore the pressure, may be but a small fraction of that assumed by Prof. Kemp. b. The only experiments which I have found upon the compressibility of water at high temperature are those of Barrus, in which he finds that the compression resulting from the pressure cited by Kemp is much less than would be necessary to neutralize the expansion due to the heat mentioned. c. Admitting for the moment that the pressure does neutralize the expansion due to heat, since the pressure is nearly the same upon both the ascending and descending columns, and inasmuch as, under the hypothesis, there is a difference in temperature between the two columns, there would be a difference in density, and therefore a cause for flowage.

8. Upon another point connected with the circulation of underground water, Prof. Kemp says: "We must bear in mind also that the standing body of cold groundwater fills the interstices of all rocks, except

\*Abstract of paper read before the American Institute of Mining Engineers, Mexican Meeting.



those in very arid regions, and exerts a retarding influence on uprising currents." I am entirely at a loss to understand how the coldness of the water prevents circulation due to difference in head and difference in temperature of the two columns, except as to an effect which I have emphasized, namely, that due to varying viscosity.

I, of course, maintain that the best energy of the igneous rocks passes into and thereby expands the water, thus causing a difference in density between the ascending and descending columns, and thereby promoting circulation. But Prof. Kemp has thrown this use of the energy act in producing a circulation, unless it be by heating and thereby expanding the water, he does not explain.

9. Prof. Kemp says that "standing water in abandoned shafts is strong evidence of the impenetrability of rocks." This seems to me untenable. Such standing water has come in either from the surface, or through the "impenetrable rocks." The latter hypothesis Prof. Kemp rejects. But if the former be true, why does not the water rise with periodic additions? According to my view, standing water in shafts, exactly as in wells, indicates the upper limit of the belt of saturation. But the standing water maintains its uniform level (in the absence of pumping) by flowage through the rocks, compensating the local additions or subtractions. Certainly the water standing in the wells of the drift covered regions of North America does not prove that there is no active underground circulation in the drift.

(TO BE CONTINUED.)

### Mine Electric Bell System.

Written for the MINING AND SCIENTIFIC PRESS by E. M. KIRK.

The following method of electrically operated bells is used in some of the large mother lode mines in California for the purpose of signalling from the shaft to the engineer at the hoist.

Five gravity cells are set up in series in a box at some station or level in the lower part of the shaft, out of the way of water and where they will not be disturbed. Two No. 8 galvanized iron telegraph wires are strung from top to bottom of the shaft. They are placed parallel about 4 inches apart and are supported on porcelain insulators fastened to the shaft dividers or uprights. Insulated wire completes the circuit from the collar of the shaft to a relay in the hoisting works, and also from the batteries underground to the shaft wires at the bottom.

In the hoisting works an Edward's electro-mechanical gong, which strikes single blows, is connected to four Fuller cells through the relay armature. Instead of the Fuller cells, connections can be made directly to an incandescent light circuit, but if so it is best to have six Leclanche cells in reserve in case the current in the light circuit is cut off temporarily.

The bell is rung in the shaft by holding the wires between the fingers of one hand and drawing the blade of a miner's candlestick held in the other hand between the wires. In shaft sinking it is handier to have a push button and length of incandescent lamp cord reaching from the lowest set of timbers to the bottom.

As the bell can be rung by touching the two wires with a candlestick, a man on the skip riding up or down at full speed can stop it instantly at stations or anywhere between levels.

At mines where one compartment is used exclusively for hoisting miners, this system, on account of its convenience, should be used in addition to the mechanical pull bell.

### Shaft Sinking on Veins.

In the prospect stage of a mine's life history, the custom of sinking on the vein or deposit, by starting work on the outcrop, has too often the result of producing a shaft with different degrees of the angle of dip, when the vein departs from the vertical. The limited means of the miner in many cases makes this manner of sinking necessary, coupled with the desire to produce ore, and also to learn the nature of the deposit. When such a shaft comes to dip at any angle between 10° to 30° from the vertical with a change of grade, the operation of hoisting becomes slow, dangerous and expensive, through the desire to follow the windings or inequalities of the vein. To make such a shaft safe and more easily operated, by making it of one grade, or nearly straight, is at best expensive for timber and often not possible. To operate a shaft of uneven grade between the angles already mentioned, where it is not desired to sink a new one in another place and use the first for an air shaft, the disadvantages must be overcome by the use of guides in such a case of change of grades, is to bolt in place a railroad rail on each side of the shaft, and as these can be fitted or bent to suit the change of dip or angle, they form strong, continuous smooth guides, on which the bucket frame or skip can be made to avoid striking the foot or hanging walls. By placing two small wheels above the rail, and two under it, one each side of the frame of the bucket or skip, the load is held at all places in the center of the shaft. It seldom happens that a prospect shaft makes a good working shaft, unless it is vertical or dips at a flat

angle when it is sunk on the dip of the deposit. The desire of the owner to follow a rich seam or stringer of ore is the chief cause of the trouble, as funds will not always permit of sinking a working shaft in the prospect stage of the mine, irrespective of the grade of ore found. In sinking a pitching or incline shaft, the constant care of the foreman has to be exercised to see that a uniform angle is sunk on by the miners.

### A Water Conduit for Power Plant.

Written for the MINING AND SCIENTIFIC PRESS by LUTHER WAGONER, M. E.

The topography of the Sierra Nevada mountains in California has made possible the use of water for power development under extremely high heads. In one instance a water pressure from 1400 feet of head is being employed, and a plant to use 1700 feet head has been projected.

Where the quantity of water used is comparatively small, the construction problems have presented no special difficulties; but the increasing use of very large volumes of water under very high heads has made the cost of installation of the water power plant a matter requiring much more consideration than with the smaller plants.

The writer, associated with Mr. J. R. Price, C. E., was lately called on to plan the construction of a large power plant, utilizing the water of the North Yuba river, in Yuba county, Cal. The plans provided for the utilization of 315 second feet of water with a drop of 1000 feet from the intake to the water wheels in a distance of 4000 feet. A single pipe to carry this quantity of water would have to be 7 feet in diameter and it would require a thickness of metal at the lower end of 1½ inches, which is not practicable. The method generally used in California under such conditions would be to divide the water among a number of pipes, so as to reduce the thickness of the metal. Assuming ¾ inch as the limit of thickness for riveted work, and taking the working strain for the iron at 12,000 pounds, there would be required to carry the water three pipes of 48 inches diameter. The metal for the three pipes would weigh about 2100 tons, which would cost in place about \$240,000, exclusive of the drum and branch pipes to the wheels in the power house. To avoid this heavy cost and insure a safer construction, and a saving of 1.2% of the power from loss as extra friction in the three pipes over what it would be in one, we devised the following plan of construction:

The country rock along the slopes from the intake to the power house is a firm, massive diabase, and it is only a short distance from the surface to solid rock. At the power house it would be proposed to excavate down to the solid rock for a foundation and to sink a circular shaft, say, 100 feet deep, in the rock. From the bottom of this a drift would be run each way under the power house. Also, there would be run an inclined upraise about 8 feet in diameter, parallel to the surface of the hill slope a distance of 4000 feet to the intake end of the conduit at the head box on the canal. This upraise would be constructed through several short adits from the hill slope, which would later be closed with concrete next to the upraise. The upraise would be lined with a sheet steel lining ¼ inch thick, made in 6-foot lengths, to slip joint in place after being well dipped in asphaltum. The space between the outside of the pipe and the wall of the rock would be well rammed with concrete. The purpose of the light pipe is to prevent leakage. Re-

liance is had on the solid rock and the concrete filling for strength to resist the static pressure.

Under the power house a similar construction of thin metal pipes in concrete backing to the solid rock will divide the main into three vertical 48-inch pipes, which will rise about 50 feet from the short drifts described above, and then branch into two 30-inch diameter, lapwelded and flanged pipes, which will enter the power house through the floor and deliver water to the wheels.

The plan would provide a construction which the accompanying sketch will illustrate. It would seem to eliminate the possibility of accident to the water conduit line. The cost of this work complete we have estimated at about \$126,000, as against \$280,000 for three 4-foot pipe lines laid on the surface in the usual manner.

Mohave County, Arizona.\*

[STAFF CORRESPONDENCE.]

The Tennessee mill has been operating on about ninety tons of ore per day, making a concentrate that runs about 65% lead, with fair silver and gold values. The material passes through crushers, two sets of 14x27 Davis rolls, revolving screens, hydraulic classifiers, jigs and concentrating tables. The slimes from classifiers pass to the tables. The five sets of jigs make 20, 15, 10 and 3-mesh products. One set is of the Hartz pattern, the others being of the drop-motion style. The tailings from all are settled in tanks, from which the water is pumped to the head of the mill for use again.

At the Elkhart a new shaft is being sunk at a point about 2000 feet north of the old shaft, and is now to a depth of 200 feet. The old shaft is over 500 feet deep, and the new one is to open and develop the same mineral belt farther north. The Elkhart mill, which has been idle for the past year, is being put in condition to operate. A considerable tonnage of ore is ready for the mill. Present work is in charge of Supt. Scrutton.

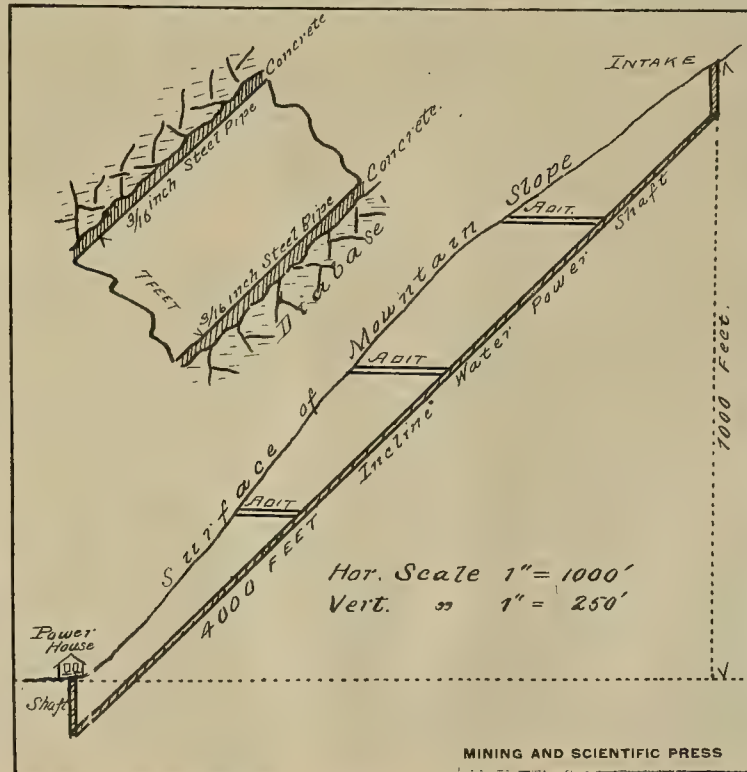
The Schuykill group, lying between the Elkhart on the north and the Tennessee on the south, now belongs to the Southwestern Mining & Reduction Co., development of the property being in charge of Manager W. D. O'Neil. A steam hoisting plant has been installed and a shaft sunk 525 feet to one side of the ore body; crosscuts will now be run to the ore from the different stations. This company has erected necessary buildings.

The Rainbow group, near Chloride, belonging to A. M. MacDuffee, has produced since it was opened about \$75,000, chiefly from the oxidized ores above the 100-foot level. Present workings are in the sulphides. The Rainbow vein parallels that of the Lucky Boy, near the top of the Cerbat range. Mr. MacDuffee reports that 2000 tons shipped ran three ounces gold, twenty-five ounces silver and 10% to 15% lead.

The Philadelphia-Arizona M. Co., owners of the Minnesota-Connor group, has its new mill well along toward completion. Its power plant comprises three high-pressure steam boilers, 100 H. P. each, provided with crude-oil burners and including Cochran heater and separator, so as to utilize the exhaust steam. This plant will operate a Corliss mill engine, hoisting engine over the shaft and a dynamo for light. Above the mill is a cemented water reservoir with 240,000 gallons capacity; and oil tanks having capacity for three carloads of oil. The mill equipment provides for different phases of concentration. It includes crusher, shaking screens, 14x27 sets of rolls, elevators, trommels, four sets three-compartment jigs, hydraulic sizers, Bradley grinder and a number of Wilfley tables and Frue vanners. The idea is to make jig products of different sizes, a middling product on the Wilfley tables and a slime product from the Frues. These different products pass to the shipping bins, where there are facilities for drying them by heat from the exhaust steam. The capacity of the mill will range from 200 to 250 tons daily.

The ores from the Minnesota-Connor comprise an iron, lead and copper sulphide, carrying gold, silver, lead and copper values. Manager E. T. Loy states that it will run about \$10 gold, fifty to seventy-five ounces silver, 30% lead; that there are streaks of white iron in which the values run five to nine ounces gold and high in silver. There is found considerable of native silver and silver glance; also,

\* See illustration on front page.



MINING AND SCIENTIFIC PRESS



streaks of antimony and arsenic, which, with the silver, forms ruby silver. The copper is said to be pretty uniformly disseminated through the ore, running from 7% to 15%. The high grades from the mine—running from \$100 to \$200 per ton—are to be shipped direct. That designated as mill ore will doubtless run from \$12 to \$20 per ton. The veins here run northwest and southeast. Mr. Loy says sufficient ore is blocked out to employ the new mill for a year.

The Lucky Boy, which belongs to T. B. Scott, has shipped a considerable tonnage of high-grade gold and silver ore and is undergoing further development, and is said to have considerable blocked out.

Chloride, Nov. 30.

WASCOTT.

### The Magnetic Concentration of Ores.\*

As early as the beginning of last century physicists had noted the magnetic properties of other substances than those easily attracted by ordinary magnets, such as iron and magnetite. Faraday carried on a set of very exhaustive experiments, making use of the most delicate physical apparatus, the results of which he published in 1846. He showed that all matter, solid, liquid or gaseous, was magnetic, i. e., either attracted or repelled by the poles of a magnet. He accordingly made the division into paramagnetic and diamagnetic substances, the former being those attracted, and the latter (by far the greater number) those repelled.

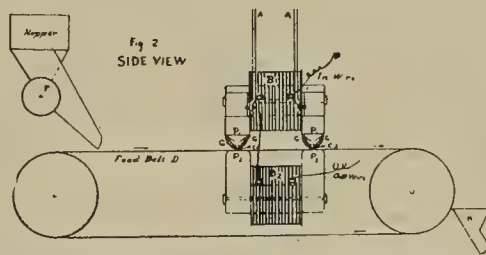
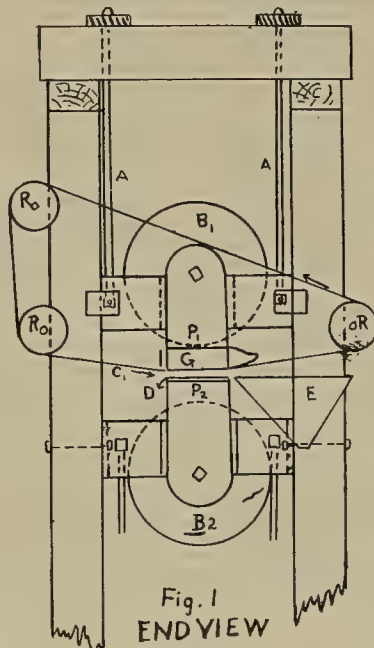
The paramagnetic substances, including the majority of mineral species, may be divided into two classes: (1) Those that are highly magnetic; (2) those that are only feebly so. The first class is complete with the substances iron, nickel, cobalt, magnetite and pyrrhotite. Some idea of the gap between these two classes will be given by the following table, taking the magnetic attractability of steel at 100,000:

|                 |        |
|-----------------|--------|
| Magnetite ..... | 65,000 |
| Siderite .....  | 120    |
| Hematite .....  | 93     |
| Limonite .....  | 72     |

Knowledge of the paramagnetic property of those substances of the second class has been one of great scientific interest, and has been made use of to some extent in the mineralogical laboratory, but Mr. Wetherill has been the first to employ it for commercial process. The object he had in view in inventing the machine was the treatment of franklinite ore of Sussex county, New Jersey. This ore is a mixture of franklinite, willemite and calcite, with smaller amounts of zincite, fowlerite, tephroite and garnet. The problem was to obtain the zinc-bearing minerals, willemite and zincite, as free as possible from the franklinite, garnet, tephroite and fowlerite, the iron-manganese bearing minerals, the presence of the latter being fatal to the direct production of metallic zinc. After much experimenting Mr. Wetherill succeeded in accomplishing this result successfully in 1895. The machine as placed in the McGill laboratories differs from his original type, both in the form of their magnets and their position with regard to the necessary belts, whereby the ore is brought into the magnetic field, and the products discharged. The McGill machine is intended for experimental work, and as far as the writer's knowledge goes is of a different design to any that have been used in practice, though the physical principles of the process are, of course, precisely the same.

Figs. 1 and 2 illustrate the arrangement of the magnets and belts.  $P_1$   $P_2$  (Figs. 1 and 2) are the pole pieces of two electro-magnets, and  $B_1$   $B_2$  the cores and spools of these magnets. The following information has been supplied by the makers: Each spool is wound with thirty-five layers of No. 12 Browne & Sharpe gauge D. C. C. copper wire. The two spools average 115 turns of wire per layer. The two magnets are so wound as to give with four amperes of current an exciting force of 32,200 ampere turns. It has been found by experience that a greater number of ampere turns for a pair of magnets with cores and pole pieces of the size employed in this machine does not increase the intensity of the magnetic fields to any noteworthy extent. The cores and pole pieces are of wrought iron, and are of the following dimensions: Cores, 6 inches in diameter 12½ inches long; pole pieces, total length 12 inches, width 6 inches and 5 inches thick. The upper pole pieces are tapered at the bottom to 45° on each side. What would otherwise be the angle of the pole piece of the first pole is rounded to a radius of ½ inch. The pole piece of the second pole is correspondingly rounded to a radius of ¼ inch. The lower pole pieces have their upper long edge rounded to a radius of 1 inch. This pointing of the pole pieces of the upper magnet is perhaps the most important feature of the machine, as by reason of it is produced the highly intense magnetic field, which is the peculiar feature of the machine. The bringing of the pole pieces to a point or rounded edge forces a great number of lines through this contracted area, thereby producing a very highly intensified magnetic field. GGGG are

pieces of brass screwed on to the sides of the pole pieces of the upper magnet to afford a smooth rounded surface for the cross belts  $C_1$   $C_2$  to run on. In operation the ground ore is fed regularly on to the feed belt D, which carries it into the field of the magnets. The magnetic particles are attracted by the intense field of the upper magnet, are picked up from the feed belt, and cling to the cross belts  $C_1$   $C_2$ , which move along the face of the pole pieces at right



angles to the direction of D. The magnetic particles cling to the cross belts as long as they remain where the magnetism is intense enough to hold them, then they drop from the belt into the hopper E. These cross belts are made of one thickness of canvas, coated with rubber and are quite thin. The non-magnetic portion of the ore remains on the belt D, and is carried over and deposited in the hopper K. The lower magnet is fixed, bolted to the frame, while the upper is hung from the rods AA, and can be moved up and down at will. The intensity of the magnetic attraction acting on the ore on the belt can be adjusted by altering the distance of the magnets from the belt, or by changing the amperage of the current passing through the magnets by means of a rheostat. A third adjustment can be made by changing speed of the feed belt, which has of course a most important effect on the capacity of the machine, the layer of ore to be separated being necessarily very thin. By making the proper adjustments a whole series of minerals can sometimes be successively picked out of an ore or rock. Beginning with low amperage and the magnets a good distance from the belts, we can gradually increase our amperage and move the magnets nearer the belt, thereby getting a series of minerals of gradually diminishing magnetic permeability.

I will now give some results that have been obtained with the machine at McGill. A test was made on a sample of franklinite ore. The ore was crushed through a sieve of ten meshes to the inch, and then divided into several sizes by screening, and each size passed separately over the machine. The result was that in each case a magnetic product was obtained containing nearly all the franklinite and other iron-manganese minerals, the zincite and willemite passing into the non-magnetic tails, which were practically free from iron-manganese materials. This is precisely the separation that Mr. Wetherill sought in inventing the machine.

One of the most interesting applications of the concentrator is in the separation of zinc blende and galena, a problem that has long been the bugbear of mill men the world over. In the case of an Ontario lead ore a middle product of mixed zinc blende and galena was formed by jigging. By crushing small enough to divide the blende and galena into separate particles, and passing the ore through the magnetic separator, a practically complete separation of the blende and galena was obtained, the blende being the magnetic product. It is said to have been made use of successfully in treating the tailings of the Broken Hill mine in Australia. These consist of zinc blende, with a certain amount of galena, rhodonite, garnet

and a quartz gangue. The material is crushed to pass through a 20-mesh sieve. The products were: (1) Magnetic heads containing all the rhodonite and garnet, and a small portion of the zinc blende. (2) Almost entirely zinc blende, but carrying 7.7% lead. (3) Quartz gangue, carrying the rest of the galena and a little blende. It is probable that with finer crushing the second product could be made to go considerably lower in lead, the lead being probably present as galena included in grains of blende. The machine has also been made use of for extracting the magnetic constituents from a corundum ore from Hastings county, in separating the various constituents of some rock from the Villeneuve mica mine, and in the concentration of certain black sands from placer workings. The machine seems to be adapted to the following work: (1) The separation of certain zinc minerals from the other injurious constituents of an ore, as at Franklin. (2) The enrichment of red and brown hematite ores. (3) The concentration of a silver-lead ore with a limonite gangue. (4) The concentration of manganese ore. (5) The separation of a mixture of apatite and rutile. (6) The removal of a rutile and garnet from a monazite sand. (7) To obtain pure garnet from garnetiferous rocks and schists. (8) Garnetiferous copper ore from Mexico. (9) Corundum ores from which garnet and other deleterious ferruginous minerals were to be removed. (10) Ores containing siderite, as in cryolite from Greenland.

### Progress of the Simplon Tunnel and Temperature Observations.

Work on the Simplon tunnel up to Sept. 30, 1901, has progressed, in the north or Brieg heading, 18,804 feet; in the south or Isella heading, 14,422 feet—a total of 33,226 feet out of a finished length of tunnel of 64,718 feet. The total advance during the month of September was 1141 feet. The average daily advance was 19.6 feet for the north heading and 18.5 feet for the south heading, both using machine drills. The average number of men employed has been about the same as previously, 3277 being employed on the work during September, as against an average of 3236 during the year ending July 1, 1901. The geological aspects of the work have undergone some changes. Up to 15,200 feet the north heading was in crystalline, calcareous slate; at that point a more micaceous, slaty rock, containing an abundance of granitic particles, was encountered. A little further on the tunnel passed into a white marble, and still a little farther on a fine-grained white gneiss was reached, which soon passed over again into crystalline slate rock. The south end of the tunnel has from the beginning advanced mainly through an extremely hard antigorio gneiss, whose resisting qualities greatly retarded progress. At about the 14,200-foot point this rock gave place to crystalline limestone, which was not expected for some time. After some 200 feet of marble, this rock in turn gradually disappeared and was replaced by calcareous, slaty and schistose formations.

Temperature observations have been regularly made, the temperature of both rock and air being taken. The maximum observed temperatures have been 92.2° F. in the north end and 88.7° F. in the south end. The water flowing in has sometimes had a temperature of about 91° F. The following table gives some observed averages of rock temperatures (corresponding figures for air are not given, as these would vary with the amount of ventilation):

| —North Heading—               |                        | —South Heading—               |                        |
|-------------------------------|------------------------|-------------------------------|------------------------|
| Distance from portal in feet. | Temperature Deg. Fahr. | Distance from portal in feet. | Temperature Deg. Fahr. |
| 1,640                         | 54.3                   | 1,640                         | 56.2                   |
| 3,280                         | 57.5                   | 3,280                         | 61.2                   |
| 6,560                         | 63.6                   | 6,560                         | 69.7                   |
| 9,840                         | 70.3                   | 9,860                         | 74.7                   |
| 12,920                        | 76.3                   | 11,150                        | 86.9                   |
| 15,090                        | 86.3                   | 11,810                        | 87.6                   |
| 16,490                        | 89.1                   |                               |                        |

Water has caused no trouble until recently. The north side has at no time yielded much water; at the end of September the flow from the portal was less than thirty gallons per second. The south heading struck water in some quantity at different points, mainly in the seamy layers on either side of the nearly dry antigorio gneiss. On Sept. 30 the flow from the south portal was only about seventy-five gallons per second; but on the morning of Oct. 1 the drills in the main heading tapped a stream of water that drove the men from the heading and compelled stoppage of work in the main tunnel. Work was then pushed in the side heading, though even here such quantities of water were encountered as to render machine drilling impossible. The total water flowing from the south portal on Oct. 1 was about 135 gallons per second, but in the three weeks following this amount increased to about 200 gallons (1000 miner's inches) with no apparent decrease in pressure at the face. In the main tunnel a shaft has been carried up to the roof at a point 65 feet back of the abandoned face, and a top heading is being driven forward from here so as to give the water larger outlet area and thereby reduce its pressure, if possible.

A very advantageous feature attendant upon the water flow has been the quite noticeable decrease in

\* From a paper read before the Applied Sciences Society of McGill University, Toronto, Canada, by Prof. E. Andrews.

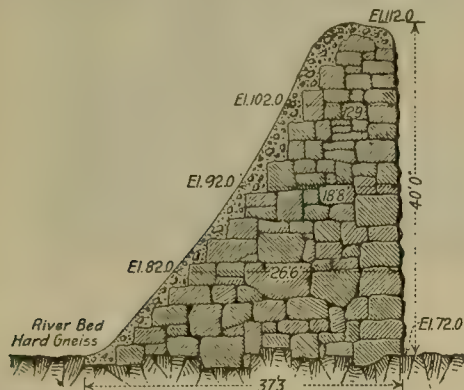


rock temperatures produced by it; the high temperatures, shown by the table above, had rendered the conditions for work much more unfavorable. The water itself when it first broke through, on Oct. 1, had a temperature of 65° F., and this has now decreased to 62° F. The normal amount of ventilation required has during the past summer been about 39,000 cubic feet of free air per minute, delivered into the north end, and 66,000 cubic feet per minute into the south end.

#### Dam of Montgomery, Ala., Power Plant.

In the construction of this dam we find a piece of masonry which certainly seems to fulfill the conditions for which it was intended. The illustration shows section of dam as built.

The first object to be secured in building a dam is to provide sufficient weight to resist the forces of the



water impounded; second, to so construct the dam as to prevent leaks or seepage. The dam was built of a very hard and durable granite, mostly quarried from the bed of the river, and the stones used were of the largest possible dimensions, some requiring two steam derricks to place them in position and weighing from nine to ten tons. The up-stream and down-stream faces of the dam were laid very carefully with cement mortar beds and joints, the up-stream face being laid with Portland cement. In the central portion of the dam very large rough stones were fitted together and all spaces filled with smaller stones, then packed with spalls, so as to form as nearly as possible a solid mass of rock without mortar. After building up this material for 5 or 6 feet, grouting boxes were placed upon the wall and the spaces between the spalls were entirely filled with liquid cement, thereby insuring all horizontal and vertical joints being entirely filled and cementing the entire dam into one solid mass. By using this method of construction, the weight of the structure has been increased about 10% over what it would be if laid up with mortar joints, and the cost of construction has also been decreased by using less cement. All liability is avoided of leaks from imperfectly fitted mortar joints, which certainly would have resulted from the use of rough rubble stone laid up in mortar.

To furnish a perfectly smooth surface for the water to pass over and to obviate the shaping of the face stones to a batter, a layer of Portland cement concrete averaging 2 feet in thickness extends from the upper side or back of the dam at the crest over the crest in a curved surface and down to the foot of the down-stream side or face of the dam.

The concrete forms were held in place by means of iron rods built into the masonry while building the dam. The batter of the down-stream face of the stonework under the concrete was formed by stepping back as the wall was built, and was left as rough as convenient to form a better surface for the adhesion of the concrete.—Engineering News.

#### Copper Imports and Exports.

Imports of copper into the United States for the first ten months of the last three years, as reduced to pounds of refined copper, are:

|                     | 1901.        | 1900.        | 1899.       |
|---------------------|--------------|--------------|-------------|
| Ore and regulus..   | 85,594,850   | 24,374,014   | 12,233,488  |
| Pigs, ingots, etc.. | 62,429,073   | 60,737,200   | 54,215,193  |
| Total copper.....   | 148,023,923  | 85,111,214   | 66,448,681  |
| Value.....          | \$21,538,916 | \$12,585,341 | \$9,188,896 |

The imports of ore and regulus in tons and values for the ten months of the last three years have been as follows:

|             | 1901.        | 1900.       | 1899.       |
|-------------|--------------|-------------|-------------|
| Tons.....   | 77,308       | 36,523      | 19,916      |
| Values..... | \$11,555,305 | \$3,290,942 | \$1,651,521 |

A comparison of imports and exports of copper the past three years in relation to the excess of exports is as follows:

|                    | 1901.       | 1900.       | 1899.       |
|--------------------|-------------|-------------|-------------|
| Exports, lbs.....  | 175,002,250 | 311,093,440 | 209,345,920 |
| Imports, lbs.....  | 148,023,923 | 85,111,214  | 66,448,681  |
| Ex. exports, lbs.. | 26,978,317  | 225,982,226 | 142,897,239 |

The effort to hold up the price of copper in the face of the lessened demand from abroad has caused the United States to be the best market in the world for the metal, with the result that in only ten months, as shown above, the excess of exports shows a decrease of 199,000,000 pounds.

#### Federal Mining Law.

So many questions are being received at present concerning mining requirements, that the following extracts from U. S. Revised Statutes are published for general information:

Section 2325. A patent for any land claimed and located for valuable deposits may be obtained in the following manner: Any person, association or corporation authorized to locate a claim under this chapter, having claimed and located a piece of land for such purposes, who has, or have, complied with the terms of this chapter, may file in the proper land office an application for a patent, under oath, showing such compliance, together with a plat and field notes of the claim or claims in common, made by or under the direction of the United States Surveyor General, showing accurately the boundaries of the claim or claims, which shall be distinctly marked by monuments on the ground, and shall post a copy of such plat, together with a notice of such application for a patent, in a conspicuous place on the land embraced in such plat previous to the filing of the application for a patent, and shall file an affidavit of at least two persons that such notice has been duly posted, and shall file a copy of the notice in such land office, and shall thereupon be entitled to a patent for the land, in the following manner: The register of the land office, upon the filing of such application, plat, field notes, notices and affidavits, shall publish a notice that such application has been made, for the period of sixty days, in a newspaper to be by him designated as published nearest to such claim; and he shall also post such notice in his office for the same period. The claimant at the time of filing his application, or at any time thereafter, within sixty days of publication, shall file with the register a certificate of the United States Surveyor General that \$500 worth of labor has been expended on improvements made upon the claim by himself or grantors; that the plat is correct, with such further description by such reference to natural objects or permanent monuments as shall identify the claim, and furnish an accurate description, to be incorporated in the patent. At the expiration of the sixty days of publication the claimant shall file his affidavit, showing that the plat and notice have been posted in a conspicuous place on the claim during such period of publication. If no adverse claim shall have been filed with the register and receiver of the proper land office at the expiration of the sixty days of publication, it shall be assumed that the applicant is entitled to a patent, upon the payment to the proper officer of \$5 per acre, and that no adverse claim exists; and thereafter no objection from third parties to the issuance of a patent shall be heard, except it be shown that the applicant has failed to comply with the terms of this chapter.

Section 2327. The description of vein or lode claims, upon surveyed lands, shall designate the location of the claim with reference to the lines of the public surveys, but need not conform therewith; but where a patent shall be issued for a claim upon unsurveyed lands, the Surveyor General, in extending the surveys, shall adjust the same to the boundaries of such patented claim, according to the plat of description thereof, but so as in no case to interfere with or change the location of any such patented claim.

By Act of Congress of Jan. 22, 1890, sections 2324 and 2325 were amended by adding thereto the following words: "Provided, that where the claimant for a patent is not a resident of or within the land district wherein the vein, lode, ledge or deposit sought to be patented is located, the application for patent and the affidavits required to be made in this section by the claimant for such patent may be made by his, her or its authorized agent, where said agent is conversant with the facts sought to be established by said affidavits; and, provided, that this section shall apply to all applications now pending for patents to mineral lands."

Section 2324 of the Revised Statutes of the United States has been amended by adding thereto the following words: "Provided, that the period within which the work required to be done annually on all unpatented mineral claims shall commence on the first day of January succeeding the date of location of such claim, and this section shall apply to all claims located since the 10th of May, Anno Domini, eighteen hundred and seventy-two."

By Act of Congress Feb. 11, 1875, Section 2324 was amended so that where a person or company has or may run a tunnel for the purpose of developing a lode or lodes, owned by said person or company, the money so expended in said tunnel shall be taken and considered as expended on such lode or lodes, whether located prior to or since the passage of said Act, and such person or company shall not be required to perform work on the surface of said lode or lodes in order to hold the same as required by this Act.

Section 2323. Where a tunnel is run for the development of a vein or lode, or for the discovery of mines, the owners of such tunnel shall have the right of possession of all veins or lodes within 3000 feet from the face of such tunnel on the line thereof, not previously known to exist, discovered in such tunnel, to the same extent as if discovered from the surface; and locations on the line of such tunnel or veins or

lodes, not appearing on the surface, made by other parties after the commencement of the tunnel, and while the same is being prosecuted with reasonable diligence, shall be invalid; but failure to prosecute the work on the tunnel for six months shall be considered as an abandonment of the right to all undiscovered veins on the line of such tunnel.

Section 2329. Claims usually called "placers," including all forms of deposit, excepting veins of quartz or other rock in place, shall be subject to entry and patent, under like circumstances and conditions, and under similar proceedings, as are provided for vein or lode claims; but where the lands have been previously surveyed by the United States, the entry in its exterior limits shall conform to the legal subdivisions of the public lands.

Section 2330. Legal subdivisions of forty acres may be subdivided into ten-acre tracts; and two or more persons, or associations of persons, having contiguous claims of any size, although such claims may be less than ten acres each, may make joint entry thereof; but no location of a placer claim, made after the 9th day of July, 1870, shall exceed 160 acres for any one person or association of persons, which location shall conform to the United States surveys; and nothing in this section contained shall defeat or impair any bona fide pre-emption or homestead claim upon agricultural lands, or authorize the sale, of the improvements of any bona fide settler to any purchaser.

Section 2331. Where placer claims are upon unsurveyed lands, and conform to legal subdivisions, no further survey or plat shall be required, and all placer mining claims located after the 10th of May, 1872, shall conform as near as practicable with the United States system of public land surveys, and the rectangular subdivisions of such surveys, and no such location shall include more than twenty acres for each individual claimant; but where placer claims cannot be conformed to legal subdivisions, survey and plat shall be made as on unsurveyed lands; and where by the segregation of mineral lands in any legal subdivision a quantity of agricultural land less than forty acres remains, such fractional portions of agricultural land may be entered by any party qualified by law, for homestead or pre-emption purposes.

Section 2333. Where the same person, association or corporation is in possession of a placer claim, and also a vein or lode included within the boundaries thereof, application shall be made for a patent for the placer claim, with the statement that it includes such vein or lode, and in such case a patent shall issue for a placer claim, subject to the provisions of this chapter, including such vein or lode, upon the payment of \$5 per acre for such vein or lode claim, and twenty-five feet of surface on each side thereof. The remainder of the placer claim, or any placer claim not embracing any vein or lode claim, shall be paid for at the rate of \$2.50 per acre, together with all costs of proceedings; and where a vein or lode, such as is described in Section 2330, is known to exist within the boundaries of a placer claim, an application for a patent for such placer claim which does not include an application for the vein or lode claim shall be construed as a conclusive declaration that the claimant of the placer claim has no right of possession of the vein or lode claim; but where the existence of a vein or lode in a placer claim is not known, a patent for the placer claim shall convey all valuable mineral and other deposits within the boundaries thereof.

Section 2332. Where such person or association, they and their grantors, have held and worked their claims for a period equal to the time prescribed by the statute of limitations for mining claims of the State or Territory where the same may be situated, evidence of such possession and working of the claims for such period shall be sufficient to establish a right to a patent thereto under this chapter, in the absence of any adverse claim; but nothing in this chapter shall be deemed to impair any lien which may have attached in any way whatever to any mining claim or property thereto attached prior to the issuance of a patent.

THE production of copper in Australia in 1899 was 8300 tons; in 1900 it was 23,000 tons. The high price of the past few years has increased mining and the construction of smelters. The Mt. Lyell copper field in Tasmania is an old one, but increased facilities for production are being provided. The North Mt. Lyell has two nests of smelters, consisting of eight furnaces, with a capacity to handle 1000 tons of ore per diem, approaching completion. Other smelters are being erected in the same district. Smelters have recently commenced operations at the Chillagoe mines upon ore yielding 8% copper. The Mt. Garnet Co. is said to be sending 1000 tons of 5% to 7% ore to its new smelter per week, which is to be greatly increased early next year. The Blayney smelter is also treating 500 tons of ore per week. West Australia for seven months of the present year has produced 5880 tons of copper, or at the rate of some 10,000 tons per year, compared with a total of 6180 tons in 1900. The Pillan Copper Co. of New Caledonia, of 200 tons daily capacity, and concentrators of 400 tons capacity, has also commenced operations, and the Girimbone mine has commenced sending ore to smelters.



### Modern Quarry Methods.

"Built of stone" has come to imply solidity, enduring merit, permanency. These qualities of resistance to time's decay suggest a material relatively slow, laborious and expensive to work. A stone bridge will outlast generations, but the reduction in cost of such structures has not kept pace with the rapid cheapening of its modern rivals in steel, terra cotta and clay products, owing to the quarrying of stone being still largely a matter of hand labor.

The direct acting channeler has cut the cost of



Wavy, Curly, Tough Sandstone, 32-Inch Ledge, Broken With Plymouth Power Wedge Holes.

channel cutting in the quarry from the former hand basis figure of 20 to 80 cents per square foot down to 1½ cents to 6 cents per square foot in corresponding material. The cost of drilling plug and blasting

square with the new system. The rate of work is very rapid. An Ingersoll-Sergeant drill, of size suitable for the hardness of rock, is handled by the regular runner and helper. The capacity varies, of course, with the rock and the required size and depth of hole. Usually holes 1½ inch square at the top and tapering to a wedge shape, 5 to 6 inches deep, are

where the lines are long and level and everything kept out of the way.

The holes are finished complete in one operation and are not even cleaned out unless stone has been dragged over them. The long, narrow lead gives plenty of driving depth without bottoming. The thin knife edges of the bit groove the hole sharp and deep



Breaks 2½ Feet Wide, 5½ Feet Deep; Broken From the Top With Plymouth Power Wedge Holes; Blocks 12 Feet Long.

sufficient for ledges up to 24 inches thick, 6 to 8 inches depth, breaking 5½-foot sheets in the quarry from which the illustrations are taken. Sheets 4 to 6 inches thick may be broken nicely with a smaller

on each side like a reamed hole, so the split or fracture leads true from one hole to the next without slivering or ragging.

The steps or offsets of the bit cut the hole wider at the top, so the draw on the wedge is on the point, low down in the hole, and as the wedge does not bear at all near the top there is no chipping, spalling or capping on the upper corners. Small common wedges are used and one-third to one-half the sledging usually required makes the break easier, thus aiding in one of the most laborious jobs in a quarry. As the hole is only 1½ inch square at the top, ¼ inch on each side of the split, there is not nearly so much waste of rock, and the surface is that of a natural break, not disfigured with plug or reamed holes, powder stains, etc., which must often be scabbled off in particular classes of work.

The Ingersoll-Sergeant Drill Co. of New York manufacture these quarry tools and further information can be obtained by inquiring of them.

### Practical Pointers.

The friction of water in pipes increases with the square of its velocity.

A gallon of fresh water weighs 8½ pounds, and contains 231 cubic inches.

Each nominal horse power of boilers will require about 1 cubic foot of water per hour.

A cubic foot of water weighs 62½ pounds, and contains 1728 cubic inches, or 7½ gallons.

A "miner's inch" of water is approximately equal to a supply of twelve gallons per minute.

The capacity of pipes increases with the square of their diameter, thus doubling the diameter increases the capacity four times.

In calculating horse power of tubular boilers, 15 square feet of heating surface is equivalent to one nominal horse power.

The mean pressure of the atmosphere is usually estimated at 14.7 pounds per square inch, so that with a perfect vacuum it will sustain a column of mercury 29.9 inches, or a column of water 33.9 feet in height.

To find the capacity of a cylinder in gallons, multiply the area in inches by the stroke in inches, which will give the total number of cubic inches, divide this amount by 231 (which is the cubical contents of a gallon in inches), and the quotient is the capacity in gallons.

To find the pressure in pounds per square inch of a gallon of water, multiply the height of the column in feet by .434. Approximately each foot elevation is called equal to one-half pound pressure per square inch.

To find the diameter of a pump cylinder to move a given quantity of water per minute at a piston travel of 100 feet per minute, divide the number of gallons by four, then extract the square root and the result will be the diameter of the pump cylinder in inches.

To find the horse power required to elevate water to a given height, multiply the total weight of the water in pounds by the height in feet and divide the product by 33,000. An allowance should be made of 25% for water friction; also about 25% for loss in steam pipe and cylinder.

The area of the steam cylinder multiplied by the steam pressure gives the total amount of pressure exerted. The area of the water piston, multiplied by the pressure of water per square inch, gives the resistance. A margin of from 30% to 50% must be added to move the piston at the required speed.



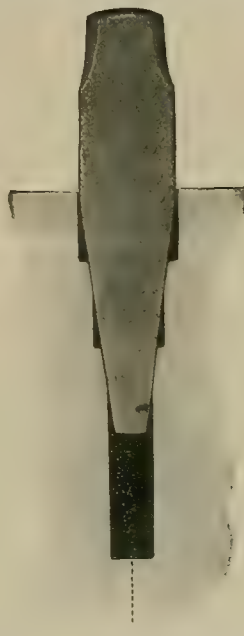
Side and Edge Views of Cutter and Wedge—Plymouth Power Wedge Hole Cutter.

holes has decreased in a like ratio through improvements gained in experience. The cost of drilling, pumping, hoisting and channeling of curb, step, sill and other finished surface dressing is being further reduced by the concentration of all power into a central high duty air compressor plant producing power at the least cost, distributing it over wide areas without perceptible loss and cutting out the many items of expense inseparable from the operation of numerous detached power stations. All these developments have been gradual and progressive, but not, in the present sense, revolutionary. Machinery now accomplishes the channeling and drilling, and compressed air is an important aid to quarrying operations, but stone still costs more to produce than it should.

The accompanying illustrations will show that the last quarry operation requiring skilled craftsmen has been reduced to a machine basis. The improved method shown is destined to widen markets for dimension stone by reducing its cost.

The Plymouth power wedge hole cutter has been improved by two seasons' experience and may be applied to any stone which will break with wedges, in which wedge holes or sheers can be cut by hand. It is believed that this will also prove successful in most limestones and perhaps in granite. Wider applications will be worked out by experience.

The illustrations are of a close-grained sandstone rock, extremely hard and tough. A break with hand-cut wedge hole is almost sure to roll or run off, but 5-foot 6-inch sheets are shown broken true and



Sectional View of Wedge Ready to Drive.

cutter, made of the worn bits—the lead and steps being shortened. The average rate all day long with competent drillers is thirty to forty-five holes per hour, though a lively crew with air or dry steam will often run a hole a minute, or 500 to 750 holes a day,



A Side View Showing V-Crease Leading the Break to the Adjoining Hole.

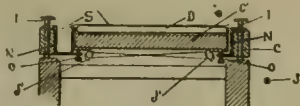


# Mining and Metallurgical Patents.

Patents Issued December 10, 1901.

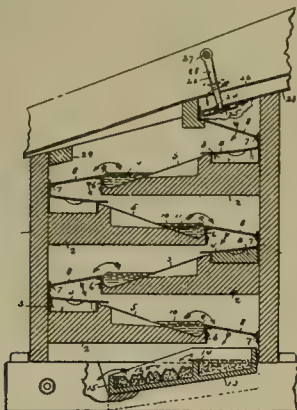
Specially Prepared for the MINING AND SCIENTIFIC PRESS

ORE CONCENTRATOR.—No. 688,567; M. P. Willits, Indianapolis, Ind.



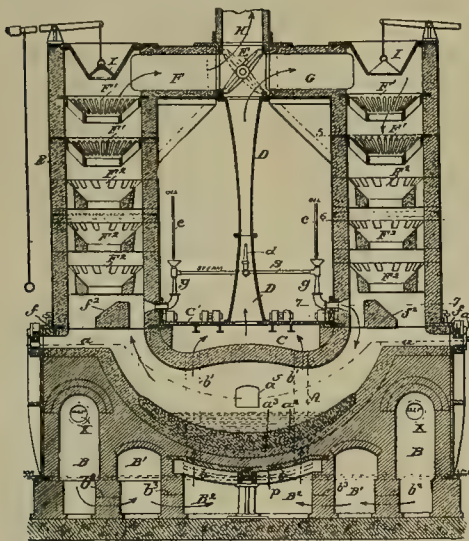
An endless belt, multiple jiggging frames thereunder, means for imparting to each side of respective frames a reciprocating motion independent of other side and of other frames, and mechanism for regulating extent of reciprocating motion of respective frames.

AMALGAMATOR.—No. 688,802; S. A. West, San Francisco, Cal.



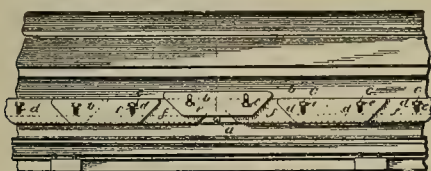
A pocket in a box adapted to contain mercury, and white or bank sand in box at side of pocket traversed by pulp before reaching pocket, sand being adapted to receive water but to float gold-containing sand of pulp and pocket projecting above sand.

COMBINED ORE ROASTER AND SMELTER.—No. 688,651; P. Kirk, Kirkland, Wash.



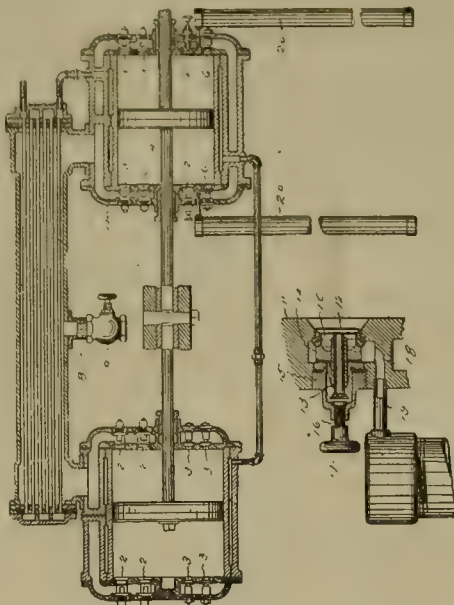
An open smelting hearth and vertical roasting chambers rising therefrom at each end and having ore supporting devices, roasting chambers and smelting hearth being in open communication, two injectors for oil and steam arranged on inner sides of each roaster, an air heating chamber with steam blower arranged between injectors, and a pipe and damper for directing hot air blast into top of either roasting chamber.

DOOR FOR ORE ROASTING FURNACES.—No. 688,587; J. P. Bridgewater, Everett, Wash.



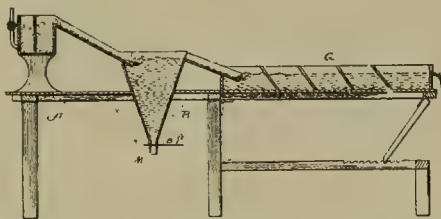
A calcining furnace having a slot in its side wall and a series of pins projecting from wall above slot, a series of plates supported on pins and having a vertical bodily movement thereon and normally closing slot, adjacent ends of plates being overlapped and lower forward edge of each plate being beveled upward.

AIR COMPRESSOR.—No. 688,520; E. Hill, South Norwalk, Conn.



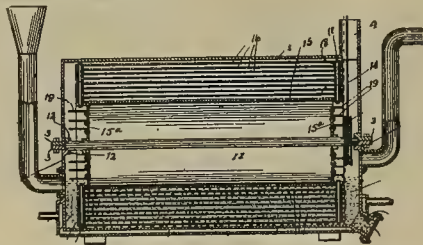
A multiple stage air compressor having an interduct that is tapped for drawing air at low pressure, an auxiliary reservoir having a capacity for air equal to quantity of air that is withdrawn from interduct for low pressure use at each pulsation of pistons, and a connection from auxiliary reservoir to high pressure cylinder of pair that tapped interduct connects.

ORE SEPARATOR.—No. 688,279; A. A. Allen, Birmingham, Ala.



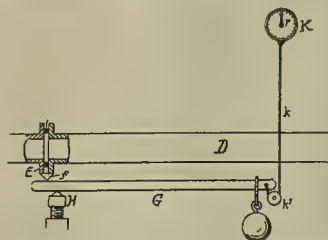
A vessel arranged to discharge by overflow a broad unbroken sheet of liquid, a receptacle arranged at a lower level to contain a body of approximately still water and to discharge by overflow at one side, a broad inclined chute extending from vessel to a point in receptacle below plane of discharge of latter and arranged to receive sheet discharged by vessel and deliver it unbroken in receptacle, and means for placing upon moving sheet discharged from vessel a thin layer of material to be separated.

AMALGAMATING MACHINE.—No. 688,439; G. C. Scott, Columbus, Ohio.



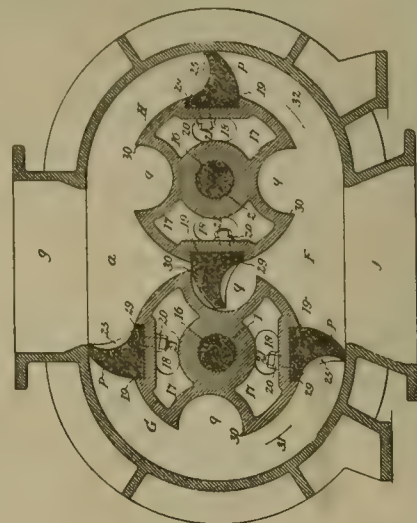
A casing, a shaft journaled therein and means for imparting a rotary motion to latter, a closed drum or body mounted on shaft, a plurality of cylindrical plates arranged one with other surrounding and connected with drum or body, a body of mercury contained in casing, latter having inlet and outlet openings.

HYDRAULIC DREDGING APPARATUS.—No. 688,338; E. Risley, Pleasantville, N. J.



A pipe having a flexible or yielding section and provided with counterbalanced lever supporting flexible section of pipe and operated by movement thereof, whereby a predetermined weight or amount is counterbalanced, and a dial-indicator actuated by lever, whereby indications above predetermined weight or amount are registered or made.

ROTARY PUMP OR MOTOR.—No. 688,616; A. Ferguson, One Thousand Springs, Idaho.



A casing comprising removably attached end plates, a shaft and an opposing piston adapted to coact therewith, a piston having a chambered body with hand holes in ends, peripheral piston blade seats and bolt holes extending into chambers, piston blades fitted to seats, and blade attaching bolts occupying bolt holes.

Saving Platinum, Iridosmium and Other Platinum Metals.

Platinum metals will not amalgamate with mercury without special treatment. To save them concentrating appliances must be used and these will also save most of the coated gold, which is usually found in black sand and will not amalgamate without treatment. Ordinary riffles in a gold-saving flume cannot be relied upon to save any considerable proportion of the platinum metals; by far the greatest value creeps over the riffle and is lost. A good concentrating surface is new Brussels or Moquette carpet. A better and more durable surface is a special grade of cocoa matting, sold at 60 cents per square yard in small quantities and 50 cents per square yard by the roll. It is made 27 inches, 36 inches and 54 inches wide; 27 inches is the most convenient width to use.

Make a box 26½ inches wide, 10 to 12 feet long, with 6 inch sides, and give it steep grade, say 24 inches in 12 feet. Screen out the gravel, using a straight flat tom iron with holes about ½ inch to ¾ inch in diameter; if practicable use clean water and just enough to run the sands nicely on the box or table. The flow of both water and sand can be regulated and controlled by strips above the matting at the head of the box to prevent too great a depth of water or sand. To clean the matting, which should be done every few days according to the richness of material, first let a little clean water run over the matting to take away the dirt; then take it up carefully and wash it in a shallow tank, flapping it to and fro to clean it of the concentrate and dirt. A good deal of value will be found on the floor of the box or table, under the matting. Brush these concentrates up with a stiff scrubbing brush, using a little clean water to carry away the dirt, then put the concentrates into the washing tank.

These concentrates in the tank can be cleaned by allowing them to run slowly over a wide sawed board of ordinary roughness. Use only enough clean water to carry out the dirt. The metals will catch on the board and can be brushed up into a vessel having a straight edge like an ordinary dustpan. The grade of this concentrating board should be about 10 or 12 inches in 12 feet. If the board be feathered in sawing, turn the feather downward and not upward against the stream. Care must be used in this operation not to run too much water, otherwise the metals may be carried away before they have a chance to get down and catch on the board surface. A little practice will show how to regulate the water and material. The concentrates obtained will contain the coated gold, platinum and platinum metals. Put them into a pan with a very strong solution of cyanide of potassium and enough mercury to amalgamate the gold. Stir thoroughly for ten or fifteen minutes and the gold will generally amalgamate. Pour off the cyanide solution and use it next time. The platinum metals will remain with the sand in the pan. To clean them of sand use a rough board in the same manner as before, keeping this board for this purpose. Use a very slow trickling stream, allowing it to drip into the bucket or pan of concentrates, just fast enough to run them out and onto the board—the bucket being tipped for this purpose. Watch this operation carefully and do not run away any metals. They will be readily recognized by the description herein given. Platinum metals are all tin white when clean, but the grains or scales are often too fine to catch the eye, and collect with a heavy fine sand and lie in streaks of brown, brown-red or lead color, which creep along the board and are evidently



heavy. Save these concentrates. If you desire to clean them entirely the sand can be dissolved by dilute nitric acid and washed away. Nitric acid does not affect the platinum metals. If the metals are not perfectly clean the factory will take the sand out, if there is not too much, and payment will be made for only the platinum and platinum metals.

The directions herein given are for a small mine. The plant must be enlarged according to circumstances, using the same principles. It is better to increase the number of tables than to enlarge them. If the local conditions should not permit to use as long a table as 12 feet, use a shorter one, but do not be afraid of giving it a good grade. In general do not crowd the tables. Use a steep grade with not too much water. Any of the surfaces named will catch the precious metals, if they can be brought down to it. The plant must be so arranged as to cause the materials and water to run with an even spread, giving the tables grade enough to carry off the sands, which are all more or less rounded, and to allow the heavier metals, usually flattened, to catch on the matting. When once caught they are practically saved, unless the matting is allowed to run dry. In this case, when water is again turned on, many of the fine scales will rise up and go off.

#### The Weber Co.'s Plant.

The Weber Gas & Gasoline Engine Co. of Kansas City, Mo., has been closely identified with the development of the gasoline engine as applied to mining equipments, hoists and pumping outfits, but has not, however, confined its efforts exclusively to these lines. The company has been engaged in engine building since 1869. At that time they occupied what would to-day be considered a comparatively small factory, although at that time it was a large institution, covering 2250 square feet. This shop was devoted to steam engine building and specialties in that line. Since 1884, however, the company has devoted its attention exclusively to the gasoline engine. At that time its factory occupied 5500 square feet, double the capacity of the old steam factory. Numerous additions were made until, in 1895, the ground floor covered 38,000 square feet. The company, however, soon had a repetition of its experience, and before long it found itself as cramped for space as at any time in its history. Accordingly, it was determined to build a new factory, and a site was selected at Eleventh and Twelfth streets and Winchester and Centropolis avenues, Kansas City, comprising an entire city block, and plans were drawn for a single-story factory of stone and steel throughout, making it entirely fireproof. This factory covers 300,000 square feet of floor space. It is divided into five main departments, devoted to gasoline engines and hoists, water works equipments, including pumping outfits, electric lighting engines, marine engines and automobile engines. Each department is equipped with electric cranes, by means of which heavy castings are moved about quickly and handled much more conveniently than could be otherwise. The power for operating these cranes is supplied by an electric plant driven by gasoline engines. In fact, gasoline engines are used throughout the factory, separate plants being installed for the several departments. The company is thus enabled to present a practical demonstration of one of the most important advantages to be derived from the use of this class of motors. Gasoline engines are placed at convenient points and supply the power for operating machinery and tools in the different departments. The records of the company show that this is a very economical arrangement. The company has its own electric lighting plant; this, too, is driven by gas engines, as is also the pumping plant which supplies water for the factory and for fire protection. At the present time the company is turning out daily an average of

ten finished engines of 20 H. P. capacity for various purposes, chiefly for mining equipments, pumping outfits and electric lighting plants.

#### Practical Pointers for Prospectors.

The prospector should observe the character of all loose rocks found in ravines or gulches, especially in eddies, which are of frequent occurrence in mountain districts. In searching the sands washed down by the river it is well to bear in mind that if the bed of the river which flows through a level or open country yields fine gold dust it will yield larger or coarser gold near the mountain, as the finer and lighter particles will float farther away.

Commonly, in a canyon or gulch where gold is found, an accumulation of boulders or gravel may be noticed high up on the sides of the range, and more or less parallel to the bed of the creek. Portions of such deposits should be carefully examined by washing in a pan, as the gold-bearing matter, whether carried there in past ages by running water or glaciers, may contain gold in rich layers, called the rim rock, which is always a riddle for the deposit of gold. Should there be several distinct deposits, the lower stratum on the bedrock would be the richest. It is advisable to remember that when gold is found in placers or hillsides the chances are that gold veins traverse the neighboring elevations of land. Such elevations may prove profitable to work, but this is not necessarily the case. Almost all the rich metal-bearing gold veins are found chiefly in the rocks of an older date than those of the coal measures, although some are found in a more recent formation. The Comstock lode was probably formed by hot alkaline waters as late as the Tertiary period. Without entering into a discussion as to the formation or origin of quartz veins, it may be said that the same law applying to veins in one district also applies to another as to their compass bearing, being parallel, although some distance may separate one lode from another. In some mining districts the second series of veins run at right angles to the first and principal. Such lodes are either of a different nature of mineral to that of the first, or, if the same, are very poor in quality. It is well, also, to remember that a true mineral vein is not likely to exist alone; but many more, either richer or poorer, may be found to form a mineral belt. For this reason the prospector should not set his affections upon one vein alone until he has examined the whole district to his entire satisfaction. In searching for veins, the prospector should study the general geological formation of the country, the cutting landslides, the cliffs, the sides of valleys, the sections of banks exposed to view by the action of water, river beds and dry channels, and if he fails to find rich samples of float rock he should travel up as long as he can find similar rock. When no more is found, he should then start up the hillside or mountain to discover the parent rock from which they came. Frequently at the base of the hill or mountain there is a deposit in the soil, washed down from more elevated ground. High up on the hill may be found the float rock in the form of boulders, or detached portions of the vein, which would not be far from the ore in place. By taking notice, however, of the various undulations and drift, the prospector may come across outcrop on the steep side of the gully or backbone of ridges; and, failing in this, he may travel toward the summits of any range of hills to find the vein.

Fluor spar is favorable for lead or copper, calc spar for lead and silver, but other valuable minerals may be looked for in gulches and ravines, such as stream tin, antimonial silver, metallic copper, platinum grains, telluride of gold, but for a gold-bearing vein there is none better than the one which has an iron cap. The iron oxide is really the result of the decomposition of iron pyrites, and the pyrites would

be found deeper down after finding the vein. The prospector may dig a trench at right angles, if possible, to the lode, in order to examine its character, the nature of the ore and the gangue, and to find the boundary wall, viz., the upper or hanging wall, and the lower or foot wall, as well as to note the direction or strike of the lode. He must sink a prospecting shaft a few feet deeper than the bottom of the trench to determine the exact body of the ore, as the lode may be distorted from its original shape near the surface. But when the direction of the lode is once ascertained, other pits lower down or higher up the hill should be made so as to test the continuity of the vein. Should the vein prove continuous, and the assays turn out well, development may begin.

At the same time no person should be led away by the hope that the deeper the vein the richer the ore. While it is a fact that lead and copper veins do improve by depth, and many gold veins have also, yet many do deteriorate in value as they go down. But it is a recognized fact that veins vary in quality and nature, according to the strata through which they pass, and there are chances that the vein may pinch out, or end in a pocket, or become changed in character and value when least expected, and it is well to err on the safe side and never take ore to an incompetent assayer to be tested. Even experienced assayers are often troubled to get the proper dressing in assaying sulphurets, arsenical or zinc ores. While the capitalist may risk his money in the chances he may take, the prospector's time and labor are worth too much to admit of his expending endless labor in obtaining experience in development work or on uncertain and unreliable assays.

If the lode carries gold or silver or other valuable metal, that fact is not enough to depend upon in estimating its worth. Often the gold is in very fine powder, invisible to the eye, or perhaps coated with a rusty film or silica, which would prevent amalgamation, and, in consequence, though the assay may be favorable, the extraction of the gold from the ore by amalgamation is not satisfactory, as the mercury may sicken or flour. Again, the ore body may be rich enough, but much depends upon the nature of the other constituents. Antimony or arsenic may render it valueless. Before digging commences several samples of the rock should be taken from the lode and examined by a competent and reliable assayer, and the facts ascertained as to the value and quality of the ore, the best method of treating, etc. Unfortunately, this is not convenient in an out-of-the-way place. To assay correctly means a course of training. For this reason no one should undertake the business unless he has practiced under the instructions of a competent assayer. Still, there is no reason why an inexperienced person should not attempt to qualitatively test minerals by some simple methods. To be compelled to go to a chemist, geologist or mineralogist for every little matter of inquiry is inconvenient and troublesome, as there are many unreliable so-called authorities met. Because some miner pronounces such a mineral to be unlike something he has seen in Cornwall, or California, or some other place, the prospector need not be too ready to accept such an opinion, for a miner may be an expert in certain matters, like running a drift, timbering a tunnel, etc., but still may have erroneous notions about such minerals as gray copper ore, silver glance, fine or coarse grain galena, etc. The most experienced mineralogist cannot for a certainty tell at first sight how much gold or silver may be in a particular rock. These metals are found sometimes in the most unlikely formations, and it is common to find a handsome, good looking specimen which will disappoint everybody and carry nothing of value at all. Many of the silicates and carbonates and chlorides are unmetallic to look at, yet have been found very rich. For a long time the chloride of silver deposits in Colorado were passed over without being noticed, as also was the case with the carbonate of lead in Leadville, which, after discovery, in five years converted Leadville into a city of 30,000 inhabitants.

After the prospector has discovered his vein of ore he must consider, before he thinks his fortune made, how far distant are fuel and water for successful operation. He must not grudge a little money in having a dozen or more of his samples assayed and obtaining the advice of a proper assayer. He must remember that a low-grade ore in one place is worth more than a rich one in another, and much more depends upon the character of the ore, whether it must be treated or not. Nearly all the great mines have been found in the manner described. All mountain regions where uplifts and foldings of strata and metamorphism have taken place are favorable to the metal-bearing veins. We have mining experts by the score every year ransacking our camps. Experts pursue their inquiries systematically. When visiting a mine they select samples of the ore from all parts of the mine, every few feet the whole length of the tunnel or shaft. These samples are assayed, then the whole number averaged. In this way they determine the value of all the ore in sight and fix the value of the mine as an investment, and if the price is not satisfactory the matter is dropped.

REPRESENTATIVE WOOD of California has introduced a bill since Congress convened to establish a Department of Mines and Mining.



The Weber Co.'s Plant, Kansas City, Mo.



# MINING SUMMARY.

Specially compiled and reported for the  
MINING AND SCIENTIFIC PRESS.

## ALASKA.

### JUNEAU.

A trust deed from the Alaska G. M. Co. of Juneau to the North American Trust Co. of New York for \$100,000 has been filed in Juneau. The Alaska G. M. Co.'s property includes eight claims between Sumdum and Windham.

### KETCHIKAN.

The Hilda M. Co. of Seattle, Wash., with C. F. Barlow as president, C. H. Gilbreath vice-president and general manager and B. F. Bringolf secretary, has bought the Hilda copper claims on the north side of Kasaan bay, near Kasaan, on Prince of Wales island.

The Ketchikan G. Co. has been incorporated in Seattle, Wash., by W. S. Grinsfelder and M. D. Lahy of Seattle, J. W. Stedman and J. B. Beagles, Ketchikan, and S. I. Silverman of Spokane, Wash., to develop a gold mine at Sea Level P. O. The 30-stamp mill now being installed on the Sea Level mine at Sea Level will be completed within sixty days.

The Clark Syndicate development work on copper properties on Tolstoi bay is reported to be showing up well.

## ARIZONA.

### COCHISE COUNTY.

The Golden Rule Copper Co. of New York, which is developing the Cuprite mines, near Vall, Mr. Lane Supt., has made a new contract with the owners of the mine, extending the bond for two years. A 14-foot ledge of sulphide ores has been struck.

### GILA COUNTY.

R. M. Foree of Denver, president of the Arizona-Colorado Copper Belt & G. M. Co., has started preliminary work on the company's property near Globe. It is the intention of the company to sink a 200-foot shaft.

### GRAHAM COUNTY.

Stevens Bros. of Los Angeles, Cal., have sold to A. F. Albert and associates of Bridgeport, Conn., fifteen claims near Metcalf.

The output of the Arizona Copper Co. for November is stated to have been 1335 tons Bessemer copper 99% fine, being an increase over the product of former months due to the new smelting plant recently completed. The output in the future, it is claimed, will range from 1300 to 1500 tons per month.

The Copper Belle M. Co., G. M. Ruff manager, is 18 miles from San Carlos. There are two shafts, one 80 feet the other 60 feet, with ore down to bottom of each. A 225-foot tunnel is being run to tap this vein 400 feet down. The company, it is reported, will put up a smelter as soon as the tunnel has reached the vein.

### MOHAVE COUNTY.

The Leonora M. Co. at Hardyville is grading for a 25-stamp mill. The ore yielded, it is said, about \$35 per ton in the 2-stamp mill.

A half interest in the Homestake group in the Gold Road district, near Kingman, has been sold to R. J. Holmes of Phoenix for \$15,000. The ore veins are said to be large and well defined, ranging in width from 8 to 50 feet, and outcroppings for a distance of about 8000 feet. The formation is quartzite and porphyry.

### YAVAPAI COUNTY.

(Special Correspondence).—The Mayer Placer M. Co., managed by W. J. Lester, is operating a dredger on the Big Bug, near the old Commercial smelter. It is of the Marion type, and is said to handle 1500 yards per day. The water supply, amounting to 10 miners' inches constant flow, is pumped from the bed of the stream. Gold values in the gravel are said to be good. The stratum of material is about 20 feet deep.

The Argyle M. Co., a Scotch syndicate, is developing a group of claims on a north and south ledge of ore, in the vicinity of Huron. Thus far the work consists of a 225-foot shaft on the vein, with a 300-foot tunnel on the same vein, this tunnel cutting into the shaft at the latter's 100-foot level. There is also some drifting southward at the 126 and 200 foot levels, showing the vein to run from 1 foot to 5 feet wide, the ore being an iron pyrite carrying gold and silver, with a small per cent of copper. The property is under the management of Geo. H. Gillespie.

Huron, Dec. 11.

(Special Correspondence).—The Blue Bell, 4 miles southeast of Mayer, now has an aggregate of 3500 feet of development work, the most of which is on the center one of the three parallel ledges covered by the company's locations. This includes 820 feet of drifting on the 300-foot

level, showing 25 feet width of copper-iron sulphide ores, carrying gold and silver, the vein being between walls of siliceous slate. The main shaft is being enlarged to 3-compartment and a double-drum geared hoist and a 10-drill Sullivan air compressor, with dynamo for light, are being put in. Manager E. A. Haggott states that the mine is sufficiently opened up to readily produce 200 tons of ore per day.

Parties interested in the Blue Bell mine have organized the Del Rio Smelting Co. of Arizona, and are making plans to erect a 200-ton smelting plant at Del Rio, on the S. F., P. & P. railroad, 4 miles north of Jerome Junction. This location is near the source of the Verde river, where there is an abundance of water, and the site is considered favorable. A tract of 320 acres of land has been acquired there. The plant will comprise copper furnaces and converters, with Nesmith hot blast and auxiliary blowers. The Blue Bell mine is to be the main source of ore supply, though a considerable tonnage of other ores will be purchased.

Mayer, Dec. 10.

(Special Correspondence).—The Val Verde Copper Co., whose smelting plant is at Val Verde, on the Agua Fria river, have recently installed a circular copper furnace, 48 inches diameter, of the Colorado Iron Works make, with Bretherton attachment for heating the blast. Their other furnace, put in when the plant was erected, is of the rectangular type, 42x120 inches diameter, constructed for lead smelting. The plant includes a Connells-ville blower, having sufficient capacity for both furnaces, and crushers and rolls for the sampling department and a briquetting machine for the fines, flue dust, etc. There are two boilers of 50 H. P. each, a 90 H. P. engine, with air compressor for pumping water from the river. The plant is to be started this month with the copper furnace only, the supply of ores comprising copper sulphides, oxides and some carbonates. J. L. Davis is Supt.

In the same locality, the Standard S. & R. Co. are erecting a concentrating plant, which is being equipped with crushers, conveyors, rolls, elevators, screens, Bartlett and Wilkey tables and slimer. The equipment is being furnished by the Colorado Iron Works, S. McKay being in charge of the construction. A spur of the P. & E. R. R. extends to both smelter and mill.

Val Verde, Dec. 11.

(Special Correspondence).—The Copper Coble M. Co., G. W. Middleton manager, is developing a property in the Bradshaw mountains, 16 miles southeast of Mayer. The locations of the group comprise 50 patented claims covering the strike of a mineral belt about 8 miles in length, the work thereon showing a ledge 8 to 30 feet wide, carrying chalcopryite ores, which Mr. Middleton states run about 8% copper, 5 oz. silver and \$2 50 to \$3 gold. The development consists of shaft and tunnel, which at present has reached a depth of 350 feet. A deeper tunnel is being run that will cut 800 feet below the surface. A force of 35 to 40 men is being employed. A compressor plant is to be put in for air drills, as well as other equipment. It is believed the Prescott & Eastern railway, a branch of the Santa Fe, P. & P. road, will extend from Mayer to this section of the Bradshaws next season.

The Saratoga G. M. Co. will now operate the Moody & Place mine, adjoining the Crowned King mine, Ed. Foltz Supt.

The Union G. M. Co. is operating the Luke mine, in the same locality. This is an old property having rich silver ore. W. J. Rainey is president of the company and C. J. Kimball mine Supt.

Crown King, Dec. 12.

(Special Correspondence).—It is announced by Senator Clark's representatives in Jerome that a 200-ton smelting plant will be erected within the next few months on Equator hill, at the Iron King mine. This property, which is about 5 miles southeast of Jerome, is well developed, showing a large tonnage of iron-copper sulphide ores. Adjoining the Iron King, on the same hill, is the Copper Chief, belonging to Connecticut parties, which is also pretty well opened up, but not operating at present. On the latter group the oxidized ores go down to 300 feet depth, below which is a copper sulphide ore of the same character as that found in the Iron King.

E. D. Treadwell and associates own and control extensive holdings between the Iron King and the town of Jerome, whereon there is a good deal of development in progress. One of the Treadwell groups is the Brookshire, which has a 200-foot shaft, a 700-foot tunnel, 400 feet of drifting on the 100-foot and 500 feet on the 200 level. This work shows a vein running east and west, the ores being a copper pyrite running about 15% copper, 15% iron and 1 oz. gold. The country rock here is diorite and slate. Another group

contains the Cliff mine, having an 800-foot tunnel which is being driven ahead to cut the ore body under a quartzite dike that outcrops at the surface.

In the same locality is the Decatur property, with a 280-foot shaft, from which a level is being run southward expecting to cut an ore body at the contact of slate and porphyry. This belongs to the Decatur M. Co., W. S. Owen, Supt.

The Black Hills group is being developed at a higher point on the range through several incline shafts and tunnels.

The Venture Hill Copper Co. have six claims in this locality, on a line between the United Verde and Copper King, and it is claimed their development shows the ore body below the slate.

Jerome, Dec. 14.

## CALIFORNIA.

The receipts of quicksilver at San Francisco for the year 1901 and the two previous years to date compare as follows:

|                    | For Nov. | Jan. 1 to Nov. 30. |
|--------------------|----------|--------------------|
| 1899, flasks ..... | 2,372    | 21,739             |
| 1900 .....         | 1,654    | 18,646             |
| 1901 .....         | 1,374    | 18,172             |

During the month of November the exports by sea were to:

|                       | Flasks. | Value.   |
|-----------------------|---------|----------|
| Mexico .....          | 250     | \$12,025 |
| Central America ..... | 100     | 4,500    |
| Total .....           | 350     | \$16,525 |
| In 1900 .....         | 435     | 19,640   |

The shipments from January 1st to the 1st of December were as follows:

|                        | Flasks. | Value.    |
|------------------------|---------|-----------|
| Mexico .....           | 3,436   | \$157,053 |
| Central America .....  | 1,008   | 45,393    |
| South America .....    | 20      | 916       |
| Korea .....            | 12      | 543       |
| Japan .....            | 24      | 1,116     |
| British Columbia ..... | 32      | 1,477     |
| Siberia .....          | 2       | 97        |
| New York .....         | 70      | 3,500     |
| Total .....            | 4,604   | \$210,095 |
| In 1900 .....          | 6,588   | 309,261   |

While the deliveries are about the same as last year, the exports show a decrease of 1984 flasks.

## AMADOR COUNTY.

The monthly report of the Del Monte M. & M. Co. at Jackson says: During November the new crosscut tunnel heading was advanced 75 feet and the mouth of the tunnel securely timbered. The east drift on the old tunnel level was advanced 30 feet, striking 3 feet of ledge matter, well mineralized and showing good values. It has been decided to work on the east drift, make a raise, and crosscut the foot wall to prospect the country beyond. The directors have authorized the immediate purchase of a compressor and drills for the work on the crosscut tunnel, that a contract be let for cutting 100 cords of wood for milling purposes, and that arrangements be made for increasing the force of men on January 1.

The Buena Vista C. M. Co. at Buena Vista has completed the necessary mine buildings and is preparing for the machinery and hoist. The company has lately discovered that the surface rock carries good values in gold and silver, and ore from the old dumps assays from \$27 to \$38 a ton.

F. A. Orr says that a rich strike has been made north of Plymouth, on the Wyona quartz mine, owned by Dr. Boyson, who uncovered a 20-inch vein that prospects as high as \$40 per ton.

B. W. Pitts and H. F. Burtwreth have made a rich strike in the Mountain Queen mine at Pine Grove, near Jackson. The mine is opened by a two-compartment shaft.

## BUTTE COUNTY.

Present operations at the Spring Valley hydraulic mine at Cherokee are limited to two monitors, which are piping on some low banks. Supt. Hill states that 30 men are employed at present and it is proposed to work on a more extensive scale next spring.

## CAVALERAS COUNTY.

M. A. Kiser has discovered a rich quartz ledge on the summit of French hill at Mokelumne Hill. The formation is porphyry. The gold is extremely fine. This prospect is within a few hundred yards of the old French hill placer diggings, which in early days were noted as among the richest in the State.

J. H. Mitchell, Supt. of the Santa Rita mine, at Mokelumne Hill, says he will start work on the property at once.

Thirty men are at present employed by the Fannie Marie M. & M. Co. at Glencoe. At the 300-foot level a 4-foot ledge has been cut and drifting on it toward the pay shoot is being done.

## DEL NORTE COUNTY.

S. White, of Kirby, Or., is opening up a quartz ledge in the Shelley creek district.

## EL DORADO COUNTY.

The Upton mine, situated about 7 miles northeast of Plymouth, has been bought by the Western Pennsylvania M. Co., which is preparing to resume work on the property. S. C. Wheeler has contracted to remove the 10-stamp mill from Quartz mountain and install it on the Upton claim. It is expected that the rock will go from \$10 to \$15 per ton.

McNaughten & Staples have bonded the Minnehaha mine, near Georgetown, and will start up the mill. Mr. McNaughten has bonded the Fred Shank mine, also near Georgetown, and will commence work there shortly. A tunnel will be run to the ledge, which runs, it is said, \$6 per ton. The mill will be built on the creek.

## INYO COUNTY.

Ledy Bros. are working on the No Sabe mine, near Independence, owned by them and A. Vanfleet, and have a 20 to 24-inch ledge which samples an average of \$20 gold, with silver and lead in addition.

## NEVADA COUNTY.

A good ledge is reported struck in the Bullion mine, at Grass Valley. The pay shoot was struck below the 1100-foot level. The vein varies from 2 to 4 feet in thickness, and it is believed will warrant the erection of 10 new stamps in the spring, thus making a 20-stamp mill for the Bullion. A new electric hoist is contemplated and heavier pumps will replace those now in use. Mr. Mainhart is Supt.

Work has been commenced at the L. ve Oak mine at Spenceville. W. Reynolds and E. B. Potter are running a drift on a contract.

C. L. Miller is opening up the Armstrong quartz mine at Sweetland.

Operations, it is stated, are to be resumed at the Lupine drift mine, near Washington. A company meeting, held in Nevada City, decided to prosecute development work immediately.

The Grass Valley Con. mine has installed electric machinery, keeping the steam machinery in place in the event of a shutdown to the electric power. The shaft has been timbered 150 feet. An air compressor installation is under consideration. Supt. Coffin says the deadwork has practically been completed, and expects to take out pay rock soon.

## MONO COUNTY.

A. B. Lemmon, of Bodie, says that a mill run of 3000 pounds of ore from the Almono mine yielded \$323, and that a mill will probably be erected on the property.

## PLACER COUNTY.

The Rising Sun quartz mine, 1 mile west of Colfax, is being developed. A tunnel is being driven from Bear river to tap the ledge at the 500-foot level of the old shaft.

It is reported that two companies will build dredgers on the North Fork of the American river in this coming spring. The tailings form a continuous mass up to 30 feet in depth and 400 feet in width for over 30 miles.

## RIVERSIDE COUNTY.

The Tresposes M. Co. has been incorporated at Riverside, with capital \$100,000, by T. Doak, G. N. Reynolds, G. Bratt, T. C. Doak and J. M. Drake, who are the directors.

## SAN BERNARDINO COUNTY.

The Bagdad M. & M. Co., operating a Bagdad, of which E. H. Stagg is manager has had milled 1000 tons of ore at the Barstow mill, which it is claimed yielded \$17,000. The 50-stamp mill at Barstow and the cyaniding plant will now be removed to the mines 8 miles south of Ludlow. The company's head office is located at Rochester, N. Y.

## SHASTA COUNTY.

H. M. Le Baron of Valley Ford, Sonoma county, has bought from Mrs. E. Hobbs the Volcano and Saint George mines near Stillwater, and from G. H. Schiller the Copper Giant and Copper King quartz mines adjoining.

F. Hall, formerly manager of the Sweepstake mine at Weaverville, has bonded at \$80,000 for eighteen months the Arps group of copper claims between Bully Hill and Copper City in the Pittsburg mining district. The Arps group is owned by R. M. Saeltzer, A. Jaegel and J. A. Kahny of Redding and W. Arps of Copper City.

W. T. St. Auburn says that he will reopen the Niagara mine at French Gulch next spring. During the winter months men will be kept at work about the mine repairing the mill.

## SIERRA COUNTY.

(Special Correspondence).—Power drills have recently been placed in the old Claybank tunnel here. This tunnel was started nearly a score of years ago to cut the Gibsonsville-La Porte channel. The tunnel is now more than a mile in length. Recently very hard rock was encountered in the face, which led to the installation of air drills. The compressor is placed at



the foot of the air shaft in the tunnel, and driven by water brought down the shaft under a head of 250 feet. It is expected that the channel will be encountered within 800 feet. The property is now under bond to A. N. Spratt and J. H. Thomas of Oakland. F. N. Fletcher of Berkeley is superintendent.  
La Porte, Dec. 18.

#### SISKIYOU COUNTY.

The McKeene mine, near Etna, has been started up after an overhauling of the cyanide plant. A 40-ton vat has been added to it. The management expects to soon have at least 75 men at work.

Several new mines at Oro Fino have started up and it is expected that a hundred men will be employed within another month. There is talk of a dredging plant for this place.

The Hathaway Bros., who own the Hathaway group of mines on Sugar creek, near Callahans, say that if a custom smelter is not erected in that district by spring they will put up one for their own use. A thousand feet or more tunneling and other development work has been done at their mine, and at the present depth copper values seem to predominate.

R. Winters is in Yreka preparing, it is reported, for the early renewal of dredger operations at Yreka. He succeeds Supt. Abbott in charge.

The Pine Grove placer mine, located about 2 miles above Oak Bar, is being operated by Detroit capital, with Newkirk & Whitney as local managers. A hydraulic lift is to be used and it is expected to start up about the 20th.

#### SONOMA COUNTY.

The discovery of a gold-bearing ledge at Bloomfield is reported. Assays are said to run from \$8 to \$18 per ton. The discovery was made where county workmen were blasting rock for road repairs. One rancher, Johnson by name, formerly a miner, has opened the ledge up by a tunnel and is arranging to set up a stamp mill on the property.

On the lands of the Henshaw estate indications of gold have been found, and on the mountain ranch of Cannon Bros., adjacent, a well-defined ledge has been traced. It is 33 inches in width, with a diabase foot wall and a slate hanging wall. A test of the outcroppings indicate gold, silver and cinnabar, the gold predominating, of the approximate value of \$12 per ton. Cannon Bros. will commence work on the ledge within a few days.

#### TRINITY COUNTY.

At the Bob's Farm mine, in Rattlesnake district, the new 2-stamp mill has been started up. The rock is estimated to run about \$28 a ton and the concentrates go \$195 to the ton. Six men are employed at the mine and mill. The property is owned by Montgomery & Byers of Weaverville.

Montgomery & Stevenson have discovered a pay ledge on their claim 8 feet in width between walls. The ore goes about \$40 to the ton.

On the Grizzly group, J. Schwartz, the owner, is running a tunnel to tap the pay shoot at a greater depth.

The gold quartz mine near Minersville, being developed under a bond by the Altona Quicksilver M. Co., shows a vein 4 feet wide, with the ore now being put on the dump rich in free gold. J. Porter is Supt.

At the Sweepstake mine the work of fitting up for the season's run is nearly completed. The reservoir has been built, and nearly all the pipe from it to the mine is in place. All the heavy iron for the completion of the Oregon Mountain siphon has arrived, and if the weather holds good for ten days the siphon will be completed. The ditch to East Weaver will be completed in another week, if the weather is favorable. As soon as the main siphon is completed water can be put on the mine.

#### TUOLUMNE COUNTY.

At the Mazeppa mine, below Stent, the shaft is down between 700 and 800 feet and sinking is being continued.

Mrs. G. W. Hall, of Quartz, has bonded at \$12,000 for one year to J. McFarland the Belcher quartz mining claim, near Stent.

#### YUBA COUNTY.

The old Jefferson mine, at Browns Valley, claimed to have been a large producer in early days, is being reopened. Since 1872 until five years ago the property has been closed down. It is claimed a company has been organized to expend \$50,000 in developing the mine.

#### COLORADO.

##### CLEAR CREEK COUNTY.

The Newhouse tunnel at Idaho Springs, Mr. Hanchett manager, has received its new electric locomotive and is now using it to haul all of the cars. A new dynamo has been installed at the compressor house and the track wired. The trains hauled consist of sixteen cars of three tons capacity each.

Owing to the demand for additional power at the mines working in the tunnel, it is understood that another compressor will be added.

The Mixsell mill at Idaho Springs has been bought by the Bonieta Co., backed by F. H. Clark, and the capacity is to be increased and tables added for concentrating.

A cyanide plant will probably be added to the Gold Standard mill on Chicago creek at Idaho Springs. The mill is being equipped for amalgamating and concentrating, and the cyanide will be used in the treatment of the slimes.

Dr. Shaller of Idaho Springs, who has bought the Mattie mill, is planning to increase its capacity by the addition of more tables.

The Dover Co. of Pittsburg, Pa., which bought the Donaldson mill at Idaho Springs, will, it is said by J. R. Alexander of the company, completely rebuild the plant to handle ores from the Dover and Brighton mines, also owned by that company. The mill has a capacity for treating eighty tons of ore daily.

The Western Mines Dev. Co. of Arizona has commenced the development of the Anglo-Saxon Extension mine, at Georgetown. The company has its head office in Phoenix, with an Eastern office in Minneapolis, Minn. The work is now being prosecuted under the immediate supervision of D. W. Shepard, manager and superintendent for the company.

#### GILPIN COUNTY.

The Ohio claim, at Russell, has been started up by J. F. Milligan, who has a 5 H. P. gasoline engine and erected a temporary building, 14x30 feet. Sinking is being carried on, and some milling ores are being taken out.

#### GUNNISON COUNTY.

At the Augusta mine, near Gunnison, the compressor plant has been installed and work with air drills started. The tunnel is expected to reach the Augusta vein in about 3000 feet from its entrance, at a depth below the old workings of the mine of 1500 feet. The company proposes to remodel the old mill as early as possible in the spring, when they will put in concentrators.

The Patriot M. & M. Co. has been incorporated by W. M. Phillips, J. R. Schermerhorn, Jr., and J. C. Butler, capital \$500,000, to operate mines at Crystal which have had considerable development done. The ore, it is claimed, shows a value in silver, lead and gold of from \$5 to \$160 per ton, and a concentrating mill plant is to be erected. Mr. J. C. Butler, of Denver, is treasurer and general manager, and L. F. Butler, of Denver, is secretary.

#### OURAY COUNTY.

The Yankee Girl and thirteen adjoining claims, near Ouray, have been sold to M. Stephens, as trustee, by G. Crawford and wife, of New York. The construction of a drain tunnel 2 miles in length is projected.

#### SAN JUAN COUNTY.

The Silver Lake people have completed surveys and estimates for an electric power plant from water power. The pressure pipe line is over 29,000 feet long and ends near Needleton, giving a fall of over 500 feet. It is proposed to use a pipe 54 inches in diameter and to develop between 4000 and 5000 H. P. It is understood that Engineer L. R. Hope has advised the construction of the power plant at once.

The Kendrick smelter people have bought the Mehia group of claims, near Silverton, from M. M. Craig. A recent sampling of the vein shows \$20 a ton ore in gold and silver, the proposition being a milling one. Men have been put on by the new owners to do development work during the winter.

#### SAN MIGUEL COUNTY.

The Ophir Con. M. Co. at Ophir, W. S. Buckley manager, has its 20-stamp mill reducing seventy-five tons of ore per day, producing fifteen tons of concentrates. Shipments are thirty-five to forty cars a month, from which smelter returns give values of from \$350 to \$500 per car. In addition four cars of crude ore are shipped monthly which yield \$400 per car. The working force is thirty-four men. The monthly expense account of the property is as follows: Electric power, \$600; mine and mill supplies, \$500; pay roll, \$3000. The credit balance now is claimed to be \$9000 per month, and with the 30-stamp addition to the mill equipment, on which work will soon be started, a much larger profit is expected.

The work of reconstruction is going on at the Bullion tunnel of the Smuggler mine at Telluride, and it is thought probable that by the first of the year a partial resumption of operations can be made.

#### TELLER COUNTY.

L. H. R. Von Ruecau, of Cripple Creek, says that his plans for a transportation and drainage tunnel penetrating the Cripple Creek district at a depth of 3000 feet

have been indorsed by the English company which has had them under consideration, and £1,000,000 of expenditure had been agreed upon. The projected tunnel runs under Battle Mountain, cutting the Coin at 2700 feet, the Stratton Independence at 2800 feet, and the Portland at 3000 feet.

In the Newell tunnel, at Cripple Creek, the company is now cutting a station in the winze 300 feet below the tunnel level. It is the intention to install a hoister in the tunnel that will be operated by compressed air.

#### IDAHO.

##### CUSTER COUNTY.

A rich gold and silver strike has been made in the Anna mine, owned by the Lucky Boy G. M. Co. The ore body discovered is about 4 feet wide and it is claimed runs about \$25 a ton.

##### KOOTENAI COUNTY.

Work is to be started on the Mexico, a silver property near Sandpoint, in the Pend d'Oreille country. J. W. Ferguson is manager. The company is planning to drive a crosscut tunnel to open three lodes on the property.

##### MONTANA.

##### FERGUS COUNTY.

The Abbey Cyanide G. M. & M. Co. has been incorporated at Spokane, Wash., to operate claims at Kendall, by J. R. Cook and J. H. Wilmot of Spokane, Wash., and J. Logan Leavel of Bossburg, who, with F. S. Aceley of Kendall, and E. Johnson of Portland, Or., who are the trustees.

In five clean-ups at the cyanide plant on the Barnes-King mine near North Moccasin since its start up, over \$35,000 has been obtained. The ore in the present workings is said to be becoming richer as the work progresses. E. W. King states that when the present mill is running to its full capacity a weekly clean-up of \$7000 is expected.

##### GRANITE COUNTY.

A rich strike of quartz is reported at the Bell Flower mine, near Philipsburg. The strike is on the 300-foot level, and consists of 5 feet of ore, much of it carrying native silver. The mine is owned by C. D. McLure and others, with F. D. Brown as manager.

##### LEWIS AND CLARKE COUNTY.

A strike of rich ore has been made in the Howard mine, near Helena. An average assay of the ore is claimed to show \$55.65 in gold per ton. C. A. Sheldon, who has a bond on the mine, had suspended work in the main shaft until a new boiler is installed. The strike is in a vein of ore found in the tunnel.

##### MADISON COUNTY.

The Fourth of July group, near Pony, E. McConnell, manager, is being prepared for extensive development, and plans are being made to erect a 60-stamp mill on the property as soon as weather will permit.

##### SWEET GRASS COUNTY.

The mill for the Standard M. Co., at Contact, has been shipped, but Supt. Murdock will store it until spring, on account of the weather making installation costly.

The mine of the Milwaukee & Natural Bridge M. Co., at Contact, is showing ore bodies that have widened out. Manager McNulty will increase the stamps by 10 or 15 as soon as the weather will permit hauling them to the mine.

##### NEVADA.

##### ELKO COUNTY.

The new mill for the mines of the King Solomon M. Co. at Charleston is under construction. W. C. Alexander is manager. About 3000 feet of development work has been done on the mines, showing, it is claimed, ore averaging 20 feet between the walls, and assaying an average of \$10 gold and from twenty to forty ounces silver. The mill will be of fifty tons capacity, arranged to be increased to 200 tons. A sawmill is being erected on the ground.

##### HUMBOLDT COUNTY.

The Sheba G. & S. M. Co. has been incorporated in Salt Lake City, Utah, capital \$500,000; G. W. Barth is president and W. H. Child secretary and treasurer. The company owns the Silver Coin, Consolation, Gold Ring, Silver Peak, Roosevelt, East Sheba and West Sheba claims and other properties in the Star mining district.

##### LINCOLN COUNTY.

The Quartette M. Co. are doing development work on the mines pending the completion of the railroad construction. On the 500 level of one of the claims it is claimed the ledge is 40 feet wide, averaging \$70 free milling ore. The company have added to their mill fifteen stamps, making thirty-five in all, and are erecting additional cyanide tanks.

G. Simmons and E. Scherniker have sold the Toltec Gem M. Co. of New Jer-

sey seventeen turquoise mining claims in Crescent mining district, west of the town of Searchlight. Tiffany & Co., people of New York, are said to be interested in the company, and it is understood that work will commence on the mines and that machinery for putting the stones into marketable shape will be erected at once close to the claims.

#### NYE COUNTY.

(Special Correspondence).—The total amount of returns from Tonopah ore shipments up to December 10th is \$1,000,000, averaging \$187 per ton. Total valuation of 30,000 tons of ore on the dumps, including shipping and milling grades, will average \$125 per ton, \$3,750,000. The total output since company started, ten and one-half months, is \$4,750,000. There will be a 20-stamp mill in operation by May 1st which will work at least seventy tons per day, and ore now out and in sight is sufficient to keep it running every day in the year. There are several other claims besides the Gold Hill group and the Clifford group, which are 6 to 15 miles from town, that already show up large bodies of good grade ore, and certainly sufficient to demand another good sized mill. The water question for the camp will be settled within ninety days. It is expected that Tonopah will have connection with the railroad at Sodaville or Candelaria some time next season. Today more people are going into Tonopah than are leaving there, notwithstanding it is 7° below zero. The new company is now in possession and say they will offer work to all who wish to remain after January 1st, on expiration of leases.  
Tonopah, Dec. 18.

J. L. Joseph of Sonora, Cal., and C. Jackson of San Francisco, Cal., and associates have incorporated the Tonopah Con. M. Co. under Arizona laws, capital \$500,000, to operate the McNamara ledge at Tonopah, on which work will commence at once.

The Tonopah mines have been taken over by the Tonopah M. Co. of Nevada, the final payment of \$186,000 having been made on December 1. The new company are now receiving machinery for hoisting and the contemplated deep shaft will soon be under way.

#### WASHOE COUNTY.

H. T. Benson and W. E. Livesly of Denver, Colo., have bought the Jumper mine at Olinghouse canyon for \$6000, and have begun development work on the mine. The old owners, Abbey, Day and Jackson, are to have 10% royalty on all ore taken out until the purchase price is fully paid.

#### NEW MEXICO.

##### OTERO COUNTY.

The American C. M. & S. Co. has been incorporated, with R. H. Morbes and W. B. Grace of El Paso, Texas, and C. H. Stevens of Santa Rosa as incorporators. The capital is \$400,000, the head office El Paso, and the New Mexico office at Tularosa.

##### SANTA FE COUNTY.

The smelter of the Santa Fe G. & C. Co., at San Pedro, has been closed for the winter, the men being transferred to the mines in which development work and stoping is to be done upon a more considerable scale. The smelter, it is stated, will resume as soon as the Santa Fe Central R. R. from San Pedro to the coal fields is completed, which is anticipated by May 1, 1902.

R. B. Thomas, Supt. of the smelter at Cerrillos, says the smelter will be blown in on January 15, 1902. Shipments of ore from the company's Hardscrabble mines at Magdalena, Socorro county, for the smelter have begun. Machinery has been ordered for a new concentrator, which is to be erected near the smelter.

##### OREGON.

##### GRANT COUNTY.

The Magnolia mine, near Granite, has been bonded to L. Y. Keady, of Portland, at \$100,000, by J. Coyle, of Granite, Jones Bros., of Sumpter, and P. A. Conde, of Baker City. It has a new 10-stamp mill on it. It is stated that a large force will be put to work on the mine at once.

At the South Cougar mine, at Granite, a long tunnel has been run in and a blind ledge struck which carries high-grade ore. This tunnel is being continued forward toward the main ledge.

##### JACKSON COUNTY.

The Braden quartz mines, near Gold Hill, which have been closed down, will resume operations soon, it is reported. Ray Bros. of New York are the owners and managers of the Braden properties.

##### JOSEPHINE COUNTY.

G. W. Johnson of Portland has bonded the Legal Tender mine in the South Myrtle Creek district, near Grant's Pass, and is developing the property.

At the Cass copper mine, near Waldo, recently bonded by R. B. Whiteside of



Duluth, Minn., at \$100,000, an 8-foot ledge carrying copper values of 15% to 60% is reported to have been struck 200 feet in on the upper tunnel. A large force of men is employed at the mine.

A large quartz ledge, carrying values in both free gold and sulphurets, has been discovered in the Dry Diggings district, 5 miles east of Grant's Pass, by H. C. Perkins and A. J. Pike. The ledge is exposed where cut across by Rogue river and in the bedrocks of the Dry Diggings hydraulic mines. Assays intended to be of average rock gave \$2.50 free gold and \$3.10 sulphurets per ton. The ledge is easily accessible for large work, lying in such a position that the rock could be quarried out in quantity.

The Dry Diggings hydraulic mines, near Grant's Pass, have been sold by H. A. Corliss to C. H. and A. H. Ament of Chicago for \$25,000. These placers have been worked for the past thirty-five years. The new owners propose to improve, repair and add to the general equipment of the mine. The widening and deepening of the ditches that bring the water supply has already begun.

The Pearl M. Co. of Elk creek, near Grant's Pass, is preparing to run its quartz mill.

At the South Myrtle gold quartz mines, near Grant's Pass, a new strike of 5 1/2 feet ore of high grade is reported in the Continental claim.

G. W. Johnson of Portland has started work on the Oatman & Robinson claims near Grant's Pass.

#### SOUTH DAKOTA.

##### LAWRENCE COUNTY.

H. Wattson and associates have incorporated the Jupiter G. M. Co., capital \$2,000,000, to develop the Dead Broke group of mines near Deadwood. The property consists of ten claims, which show ore that, it is claimed, will average about \$6 a ton. This ore, it is said, can be mined and milled for \$1.50 a ton. The company has ordered a 200-ton cyanide mill. The ore is a conglomerate made up of gravel, cemented together by peroxide of iron. The body is 30 feet thick where it outcrops.

The Homestake M. Co. has bought the stock of the Father de Smet M. Co. and taken possession of that company's property. The new De Smet mill and hoisting plant will commence at once the work of developing the mine below the 200-foot level.

#### UTAH.

##### JUAB COUNTY.

The Uncle Sam Co. of Tintic is considering the erection of a concentration mill.

##### SALT LAKE COUNTY.

The Rogers concentration mill at Bingham has been bought by E. A. Wall of Salt Lake City. The intention of the buyer, it is understood, is to make additions to the machinery and to remodel the plant.

The Highland Girl M. Co. has been incorporated in Salt Lake City, capital \$10,000, with A. Shaw, president, and C. M. Nielsen, secretary. The company owns the Superior and Imperial claims at Big Cottonwood.

##### SUMMIT COUNTY.

The Comstock M. Co., at Park City, is to equip its mine with a concentration plant. The milling ores at the Comstock are said to be entirely free from zinc and show an average of 16 ounces silver, 14% lead and \$4 gold per ton. To raise the grade to a commercial proposition, the company has planned a mill of at least 100 tons daily capacity, arranged to be increased as the ore bodies justify it. Manager Dusseldorf says reports from the mine are very encouraging.

##### WEBER COUNTY.

The Equity G. M. & M. Co. has been incorporated at Ogden, capital \$125,000, with W. C. McLaughlin, president, and J. B. Milner, secretary. The company owns the Peacock, Admiral Dewey, Flying Dutchman, Retriever Nos. 1, 2 and 3, Antem, Iron, Venus, Jupiter, Star Fraction, Antem Nos. 1 and 2, and Peacock No. 2, in the Weber mining district.

The Lost Lode Co., capital \$20,000, has been incorporated in Ogden with J. W. Conlisk, president, and G. F. Busch, secretary. The company owns the Lost Lode claims Nos. 1, 2, 3 and 4, in Birch Creek district.

#### WASHINGTON.

##### CHELAN COUNTY.

The King Solomon group of mines, near Cle-Elum, has been sold by E. Whitson, F. Parker and K. Dunlap, for \$50,000, to A. W. Frater of Seattle, acting for himself and Cleveland and Buffalo people. The property consists of four claims, from which much ore has been taken out already. The assays run from \$11 to \$60 to the ton in gold and about 5% copper.

##### SPOKANE COUNTY.

The Rustler M. & M. Co., capital \$250,-

000, has been incorporated by D. P. Bowlers, W. D. Wrighter and W. W. Thornton of Spokane.

#### WYOMING.

##### ALBANY COUNTY.

G. C. Clark of Cheyenne and associates have relocated the Abandon mine in the Jelm district, 30 miles southwest of Laramie, and sunk a shaft 20 feet from the abandoned workings. In this, at a depth of 50 feet, ore of great richness has been found. It is reported that machinery will at once be put in to develop the property.

##### CARBON COUNTY.

The ore of the New Rambler mine in Grand Encampment district is claimed to carry platinum. Assays on ore, it is reported, give 1.5 to 6.8 ounces of platinum to the ton. An assay on matte from the Grand Encampment smelter is said to give 67% copper and 4.64 ounces platinum to the ton. The discovery, if confirmed, is unique.

#### FOREIGN.

##### BRITISH COLUMBIA.

The annual meeting of the Black Cock (Ymir) Gold Mines, Ltd., has been held. A. J. McMillan of Rossland was re-elected chairman and W. Tomlinson secretary. The company propose to resume work on the mine at Ymir.

The report of Managing Director R. J. Frecheville on the Le Roi mine, at Rossland, shows that the gross value of the ore in sight is \$5,687,000, and that it can be estimated to give a net profit of \$1,221,000. The tonnage in reserve is estimated at 484,000 tons. On the basis of 20,000 tons a month, the normal rate of shipment, the ore in sight will keep the mine running for two years. Mr. Frecheville says that on the lowest level of the mine there is an ore body 24 feet wide, averaging \$15 a ton. The average value of all the ore in the mine is \$11.75 a ton, and he reports that the total cost of treating it in future should be not more than \$9 a ton.

The Neepawa group, near Slokan, has been bonded for 18 months to English people by A. McGillivray and E. Shannon, New Denver, and associates. The bonders have commenced work on the property. W. H. Sanford of New Denver is in charge.

The Rockland C. Co., recently incorporated at Grand Forks, capital \$2,000,000, has elected J. P. Graves president and G. W. Wooster secretary and treasurer. The mine, which is on Slokan lake, will be developed next spring.

The War Eagle mine at Rossland is being unwatered. The intention is to start regular underground work as soon as the mine is clear. No ore will be shipped, however, until the improvements at the Trail smelter are completed.

J. Marshall, of Lillooet, states that the Anderson lake group, near Lillooet, in which he is a large shareholder, has been bonded to San Francisco, Cal., people at \$60,000 for one month. The present owners have a 10-stamp mill in operation, and have two tunnels opening the mine.

#### MEXICO.

The Sonora M. & M. Co. at Sonora has sent a quantity of ore for experimental treatment to Los Angeles. Con. O'Keefe, president of the company, is with the ore being tested and expects to order machinery on the result of the test. The ore shipped for the test was an average of the developed mines, an assay of which gives \$15 per ton. Forty-five men are employed taking out ore and on development work.

The Mexican Anthracite Coal & Mining Co. has been organized to work anthracite coal fields reported to be in the San Marcial valley, Sonora, 30 miles from Hermosillo and 20 miles from tidewater at Guaymas. The anthracite is 85% carbon. A shaft 300 feet deep has been sunk and a concession from the Mexican Government requires that 150 men shall be steadily employed at the mines before the end of 1901. A railroad 32 miles long will be built between the mines and Hermosillo and Guaymas. It is proposed to ship the coal to San Francisco.

#### KLONDIKE.

Hanaum & Cowan have sold the Graftor group of mines at White Horse to the Moore Investment Co. of Seattle, Wash., for, it is reported, \$30,000. Development work on the Graftor mines has been started and several carloads of ore are to be taken out and shipped to Seattle for a mill test.

A big mining rush has taken place to Mayo creek, in the Stewart River district. The rush is said to have been started by prospectors discovering placers along Mayo creek which appeared to have been worked about two years. It is said that several Swedes had been working on the creek secretly, not recording their discovery, fearing a rush that would get the claims away from them. The stamperders are said to have located the entire creek.

#### Personal.

COL. H. B. MAXSON of Reno, Nev., is in San Francisco, Cal., for medical treatment.

F. ROBINSON has been appointed foreman of the Red Cloud mine at Leadville, Colo.

N. B. WHITE of the Hartford M. Co. of Custer City, Idaho, is in Salt Lake City, Utah.

E. R. STAFFORD is now superintendent Horse Shoe Copper M. Co., Safford, Arizona.

LEO VON ROSENBERG is in San Francisco, Cal., for a few days, en route to Mexico.

K. KLING is Supt. Seattle Co-operative M. Co., at its placer mine near Jacksonville, Or.

A. B. COOK of Auburn, Cal., assumes management of the Crystal M. Co., Crystal, Colo.

CHESTER W. BROWN, manager Inca M. Co., Peru, S. A., is visiting Los Angeles, Cal.

F. M. ISH has returned to Cripple Creek, Colo., after several months absence in Nevada.

FRANK HALL, formerly manager of the Sweepstakes M. Co. at Weaverville, Cal., is in Mexico.

CHARLES B. RICHARDSON of Newsome, Idaho, will sojourn for some months in Oakland, Cal.

C. P. HARRINGTON succeeds T. C. Schwarz as manager Iron-Silver M. Co., Leadville, Colo.

W. H. HENDER has been appointed superintendent of the Arizona C. & S. Co., at Globe, Arizona.

H. C. WOODROW of the Texas, Shasta county, Cal., mine, has returned there from San Francisco.

D. W. SHEPARD has been appointed manager of the Western Mines Dev. Co., at Georgetown, Colo.

J. E. WILSON, M. E., of Los Angeles, Cal., is at Nogales, Arizona, examining mines near that place.

S. G. WESTON, manager of the Baltimore mine, near Elko, Nev., is sojourning in Salt Lake City, Utah.

VICTOR N. CLEMENT has returned to Salt Lake City, Utah, from a month's professional trip to Mexico.

W. H. THOMAS, consulting engineer for the British Columbia Copper Co. of Greenwood, B. C., is in New York.

T. E. SCHWARZ, manager of the Iron-Silver M. Co., at Leadville, Colo., has resigned on account of ill health.

J. D. THOMPSON, manager of the Bonanza mine at Quitova, Sonora, Mexico, is sojourning at Pasadena, Cal.

J. T. LEATHAM of Grass Valley, Cal., has been appointed superintendent of a mining property near Casa Grande, Ariz.

MANAGER CARSON expects to employ 200 men at Pony, Mont., when the Jeanette G. M. Co.'s 100-stamp mill is finished.

P. MIXSELL, who has returned to Idaho Springs, Colo., from California, says that he will return there in the spring to put up a stamp mill.

WM. T. ST. AUBURN, former Supt. of the Niagara mine at French Gulch, Cal., has returned from New York and is now in Redding, Cal.

H. A. KELLER, late of Kennet, Cal., will make his headquarters at 120 Sutter street, San Francisco, Cal., as heretofore, after Jan. 1, 1902.

MR. DAVIS, the inventor of the Davis Calyx drill, will personally superintend the operation of one on the Brunswick lode, Virginia, Nev.

A. M. CANDEL of Denver, Colo., is now busily engaged in compiling the catalogue for the Mine & Smelter Supply Co. referred to on this page.

E. McDONALD, formerly with the Montana Ore Pur. Co. at Butte, Mont., has been appointed manager of the Fourth of July mines at Pony, Mont.

L. C. TRENT, now manager Mt. Lyle C. M. Co., Kelley Basin, Tasmania, writes that the new plant he is now putting in will be one of the largest in the world.

D. B. HUNTLEY, manager the De Lamar Co., De Lamar, Idaho, has resigned to assume charge of mining operations in Rhodesia, South Africa, whence he leaves Jan. 1, 1902.

A. S. BIGELOW, who has been Supt. of a large mine in Siberia for several years, is at his former home, Columbia Hill, Nevada county, Cal. He may return to Siberia again.

F. L. SIZER has relinquished the operation of the Rosario mine, Guadalupe-y-Calvo, Mexico, and will resume the practice of consulting mining engineer, at Butte, Montana.

PRESIDENT E. C. VOORHEES of the California State Mining Association has

returned to Amador county, Cal., from San Francisco. While in the latter city he appointed the members of the several standing committees of the Association for the ensuing year.

A. M. RANDOL, for many years with the North Star Mines Co. at Grass Valley, Cal., has an appointment as head book-keeper at the Cananea Con. mines at La Cananea, Sonora, Mexico.

J. W. WESTFALL, of Trout Lake, B. C., superintendent of the Old Gold Q. & P. M. Co. and of the Primrose G. M. Co., was reported in Rossland, B. C., on the 12th inst., en route to San Francisco, Cal.

E. V. ORFORD, assistant manager of the De Lamar mines at De Lamar, Idaho, has been appointed manager, vice D. B. Huntley, resigned. Thos. Davey, who made so good a record in the tunnel work there, continues as mine Supt.

FIRST LIEUT. ROBT. P. JOHNSON AND LIEUT.-COL. DAVID P. HEAP have been nominated by President Roosevelt as members of the California Debris Commission. He has also nominated Col. Geo. S. Gillespie to be chief of engineers, U. S. A.

#### Commercial Paragraphs.

THE Mine & Smelter Supply Co., with offices at Denver, Colo., Salt Lake City, Utah, El Paso, Texas, and City of Mexico, write that they are now compiling a 700 page catalogue of mining machinery and supplies that is to be issued in the early spring. They say: "This book is to be one of the best and completest catalogues ever published in its line. It will touch on every branch of machinery and tools of importance to mining and machinery men. The book is being laid out along original lines that will make it a ready reference book of great value. Aside from its completeness as to material the book is to be a fine edition typographically. None but the best of illustrations will be used and the paper will be of a very high grade. The circulation will be very large, the book going to all prominent mining and machinery men in the Western States and Territories, as well as in foreign countries."

#### Catalogues Received.

The Sullivan Machinery Co. of Chicago, Ill., have issued Catalogue No. 45 on Sullivan-Corliss engines. It gives in comprehensive form data and specifications for these engines, and like the other catalogues issued by this company will be a useful book of information to machinery users. The Sullivan Machinery Co. will mail it on application. Address 135 Adams street, Chicago, Ill.

BAKER & HAMILTON of San Francisco, Cal., have issued a trade catalogue, the fifteenth annual, descriptive of the Peerless boiler and engine. The large number of sizes and types adapted to special uses which this firm manufacture are exhaustively described and illustrated in this catalogue, which will be mailed on application to them.

#### Recently Declared Mining Dividends.

|                                        |          |
|----------------------------------------|----------|
|                                        | Payable. |
| Gwin Mine Dev. Co., Cal., No. 28,      |          |
| 5 cents per share, \$5000.....         | Dec. 17  |
| Empire Q. M. Co., Cal., \$100,000..... | Jan. 2   |

#### New Patents.

DEWEY, STRONG & Co.'s SCIENTIFIC PRESS PATENT AGENCY, 330 Market St., S. F., has official reports of the following U. S. patents issued to Pacific coast inventors:

FOR THE WEEK ENDING DEC. 10, 1901.

688,456.—STREET RAILWAY SWITCH—W. J. Bell, Los Angeles, Cal.  
 688,289.—FIRE ESCAPE—H. H. Boyen, Bakersfield, Cal.  
 688,587.—FURNACE DOOR—J. P. Bridgewater, Everett, Wash.  
 688,295.—BOILER FEEDER—C. Cummings, Oakland, Cal.  
 688,622.—CAN HEADING MACHINE—E. E. Forry, S. F.  
 688,727.—CAR TIPPLE—Geske & Miller, Seattle, Wash.  
 688,776.—CARBURETER—C. V. Greenamyer, Los Angeles, Cal.  
 688,636.—MAGAZINE GUN—G. W. Gruver, Priest Valley, Cal.  
 688,415.—MORTISING MACHINE—W. L. Holman, S. F.  
 688,522.—CANE TRANSPORTATION—A. Horner, Pasadilla, H. I.  
 688,536.—CAR COUPLING—W. H. Keen, Acampo, Cal.  
 688,651.—ORE ROASTER—P. Kirk, Kirkland, Wash.  
 688,785.—JOINT LOCK—R. H. Knight, Pasadena, Cal.  
 688,474.—DRIVING GEAR—H. W. Lupton, Los Gatos, Cal.  
 688,660.—GOPHER GUN—O. L. Maxfield, Hollister, Cal.  
 688,747.—HASP LOCK—J. A. McMillen, S. F.  
 688,748.—VEHICLE—R. A. Morton, San Jose, Cal.  
 688,795.—VEHICLE BRAKE—B. W. Scott, San Jose, Cal.  
 688,708.—NUT LOCK—J. M. Sigafus, Perris, Cal.  
 688,559.—MUSIC LEAF TURNER—M. R. Stapp, Aberdeen, Wash.  
 688,802.—AMALGAMATOR—S. A. West, S. F.  
 688,566.—ROTARY ENGINE—S. M. Williams, S. F.  
 688,454.—CABLE TENSION DEVICE—A. L. Wilson, Seattle, Wash.



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ASSESSMENT NOTICES.

**YUBA CONSOLIDATED GOLD MINING COMPANY.**—Location of principal place of business, San Francisco, California; location of works, Nevada County, California.

Notice is hereby given that, at a meeting of the Board of Directors, held on the 17th day of December, 1901, an assessment (No. 5) of three cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, Room 124, 11th floor, Crocker Building, corner of Post and Market streets, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 25th day of January, 1902, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 15th day of February, 1902, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.  
**EDWARD H. STEARNS, Secretary.**  
Office—Room 124, Crocker Building, San Francisco, California.

**GARIBOLDI MINING COMPANY.**—Location of principal place of business, San Francisco, California; location of works, Mariposa County, California.

Notice is hereby given that, at a meeting of the Board of Directors, held on the 14th day of December, 1901, an assessment (No. 1) of one and one-half (1½) cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, Room 18, 550 California street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 21st day of January, 1902, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on SATURDAY, the 11th day of February, 1902, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.  
**R. L. OHENEY, Secretary.**  
Office—Room 18, 550 California street, San Francisco, California.

**NATIONAL CONS. MINING COMPANY.**—Location of principal place of business, San Francisco, California; location of works, Rich Gulch, Shasta County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 16th day of November, 1901, an assessment (No. 15) of five (5) cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 773 Mission street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 26th day of December, 1901, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on THURSDAY, the 23d day of January, 1902, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.  
**GEO. W. FLEISSNER, Secretary.**  
Office—773 Mission street, San Francisco, California.

**ORLEANS CONSOLIDATED MINING COMPANY.**—Location of principal place of business, San Francisco, California; location of works, Grass Valley, Nevada County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 16th day of November, 1901, an assessment (No. 1) of two (2) cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 324 Pine street, Room 10, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 26th day of December, 1901, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on THURSDAY, the 30th day of January, 1902, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.  
**GEO. P. THURSTON, Secretary.**  
Office—324 Pine street, Room 10, San Francisco, California.

**INYO MARBLE COMPANY OF CALIFORNIA.**—Location of principal place of business, San Francisco, California; location of works, Inyo, Inyo County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 19th day of November, 1901, an assessment (No. 35) of five (5) cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, Room 31, 10th floor, Mills Building, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 15th day of January, 1902, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 11th day of February, 1902, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.  
**CHARLES E. ANDERSON, Secretary.**  
Office—Room 31, 10th floor, Mills Building, San Francisco, California.

**MARINA MARISCANO GOLD MINING COMPANY.**—Location of principal place of business, San Francisco, California; location of works, Sunny Hill, Shasta County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 4th day of December, 1901, an assessment (No. 26) of four cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 217 Sacramento street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 6th day of January, 1902, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 27th day of January, 1902, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.  
**CHAS. BOVONE, Secretary.**  
Office—217 Sacramento street, San Francisco, California.

**DUDLEY MINING COMPANY.**—Location of principal place of business, San Francisco, California; location of works, Bodie, Mono County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 11th day of December, 1901, an assessment (No. 13) of two (2) cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, Room 56, No. 309 Montgomery street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 13th day of January, 1902, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on TUESDAY, the 4th day of February, 1902, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.  
**J. STADTFELD JR., Secretary.**  
Office—Room 56, No. 309 Montgomery street, San Francisco, California.

DELINQUENT SALE NOTICE.

**LARKIN MINING COMPANY.**—Location of principal place of business, San Francisco, California; location of works, El Dorado County, California.

Notice.—There are delinquent upon the following described stock, on account of assessment (No. 11) levied on the 7th day of November, 1901, the several amounts set opposite the names of the respective shareholders, as follows:

| Name.               | No. Cert. | Shares. | Am't. |
|---------------------|-----------|---------|-------|
| Jno. W. Hinton..... | 423       | 2 00    | 40 00 |
| Jno. W. Hinton..... | 424       | 1 00    | 20 00 |
| Jno. W. Hinton..... | 425       | 10 00   | 20 00 |
| Jno. W. Hinton..... | 426       | 5 00    | 10 00 |
| A. R. Clary.....    | 433       | 5 00    | 10 00 |

And in accordance with law, and an order from the Board of Directors, made on the 7th day of November, 1901, so many shares of each parcel of such stock as may be necessary, will be sold at public auction at the office of the company, 112 Main street, San Francisco, California, on MONDAY, the 6th day of January 1902, at the hour of 2 o'clock P. M. of said day, to pay said delinquent assessment thereon, together with costs of advertising and expenses of sale.

**N. F. REMINGTON, Secretary.**  
Office—112 Main street, San Francisco, California.

Annual Meeting.

The Regular Annual Meeting of the Stockholders of the **THORPE MINING COMPANY** will be held at the office of the company, 632 Sacramento St., San Francisco, California, on THURSDAY, the 28th day of December, 1901, at the hour of 2 o'clock P. M. for the purpose of electing a Board of Directors to serve for the ensuing year, and the transaction of such other business as may come before the Meeting.

Transfer books will close on MONDAY, December 23d, 1901, at 2 o'clock P. M.

**A. F. FREY, Secretary.**  
Office—632 Sacramento St., San Francisco, California.

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Solid Gold Spectacles, \$5.00 and upward.  
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**THE CALIFORNIA DEBRIS COMMISSION,**  
having received applications to mine by the hydraulic process from Jerry Buckley and A. H. Soper, in the Gray Lizard Mine, in Butte Co., near Rackerby, to deposit tailings in Swede's Flat Creek; from Jos. D. Countryman, in the Tannery Mine, at Oregon Hill, Yuba Co., to deposit tailings in Oregon Creek; and from Manuel Fernandez, in the Independence Mine, at New York Flat, Yuba Co., to deposit tailings behind the dam of the Nevada Mining Co., gives notice that a meeting will be held at Room 56, Flood Building, San Francisco, Cal., on December 23, 1901, at 1 30 P. M.

**THE CALIFORNIA DEBRIS COMMISSION,**  
having received applications to mine by the hydraulic process from Jerry Buckley and A. H. Soper, in the Gray Lizard Mine, in Butte Co., near Rackerby, to deposit tailings in Swede's Flat Creek; from Jos. D. Countryman, in the Tannery Mine, at Oregon Hill, Yuba Co., to deposit tailings in Oregon Creek; and from Manuel Fernandez, in the Independence Mine, at New York Flat, Yuba Co., to deposit tailings behind the dam of the Nevada Mining Co., gives notice that a meeting will be held at Room 56, Flood Building, San Francisco, Cal., on January 6, 1902, at 1 30 P. M.

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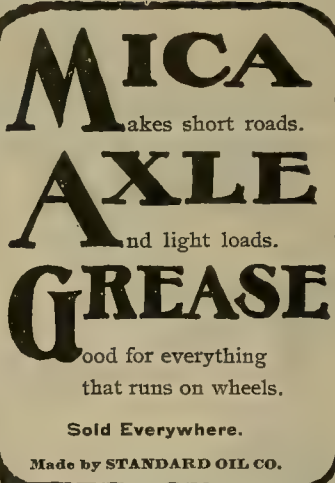
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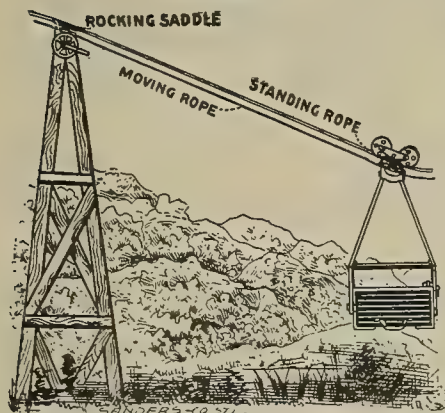


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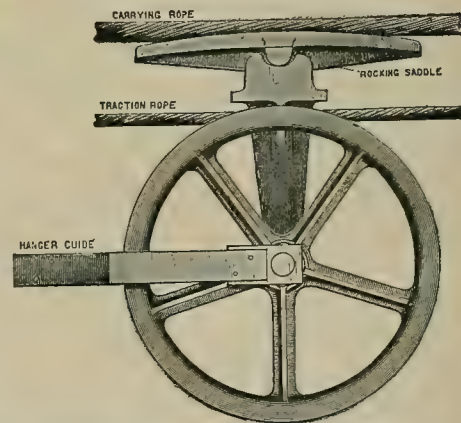
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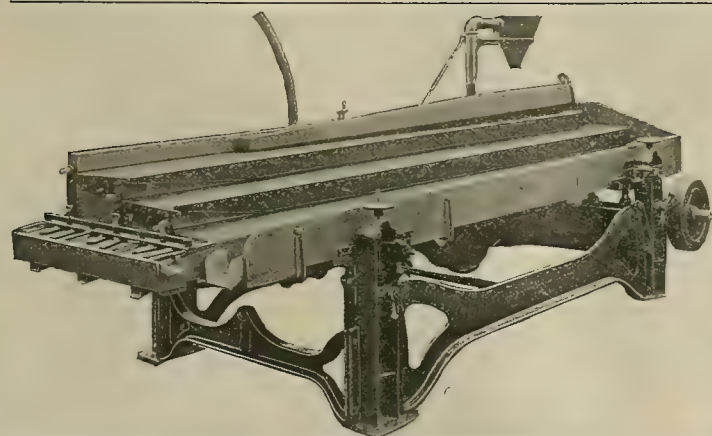
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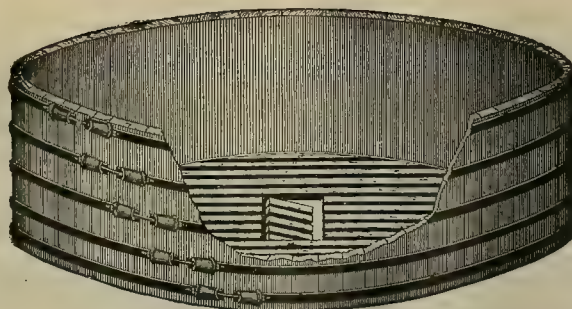
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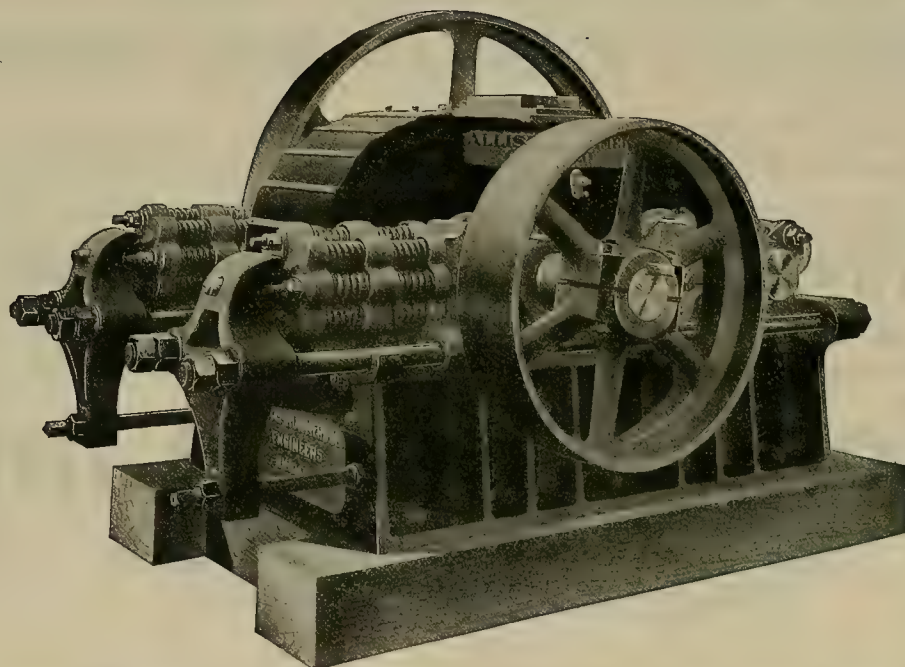


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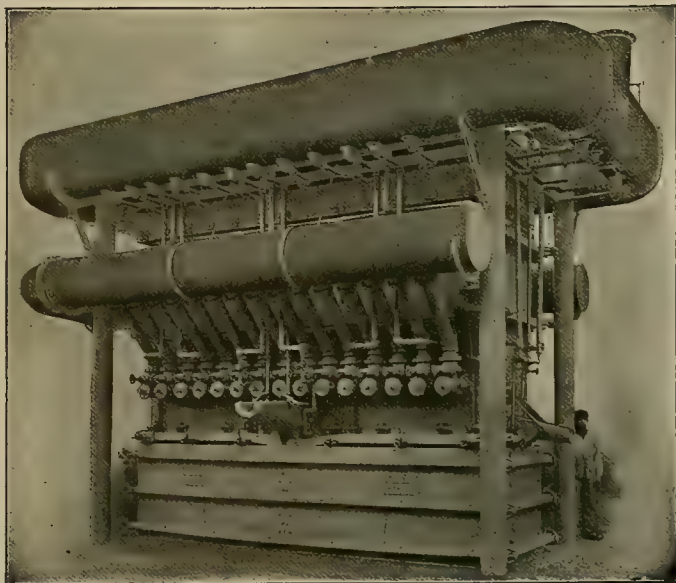
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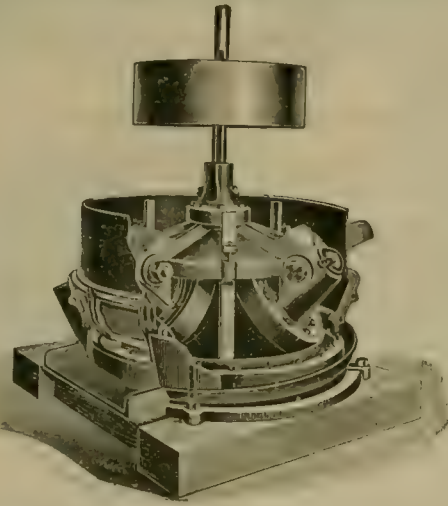
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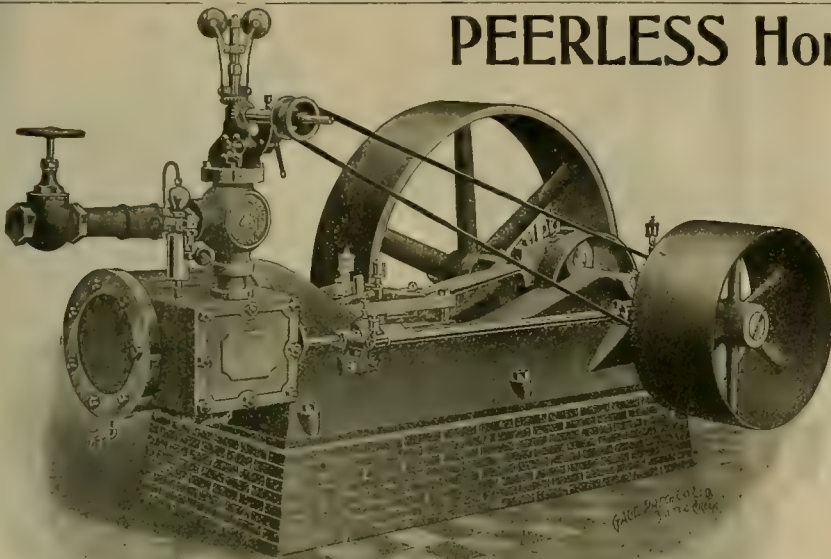
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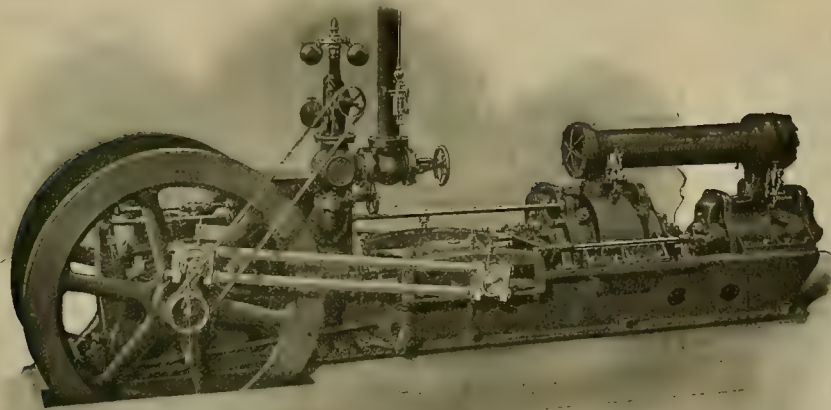
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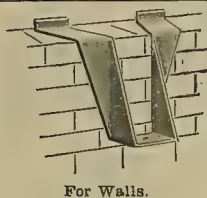
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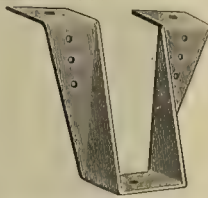


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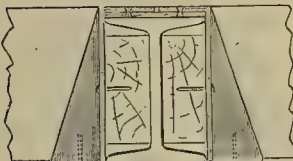
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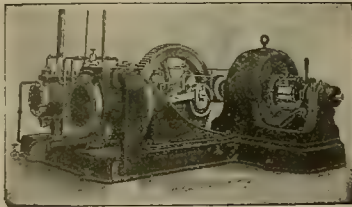
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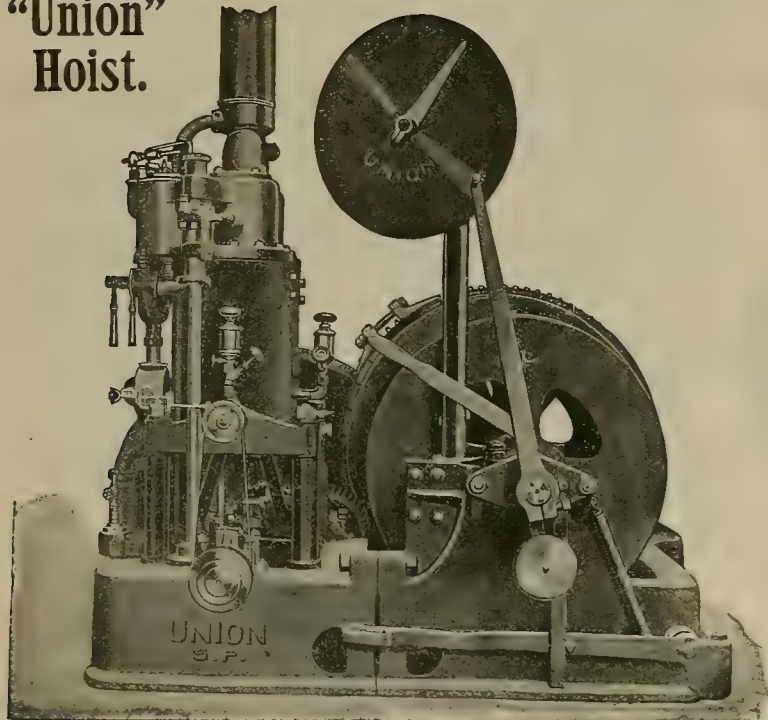
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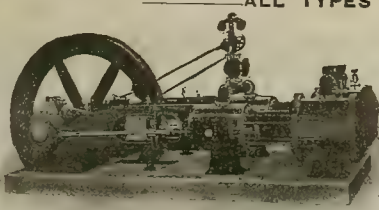
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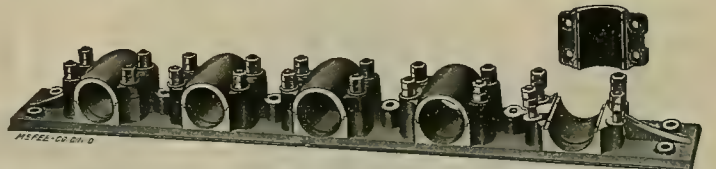
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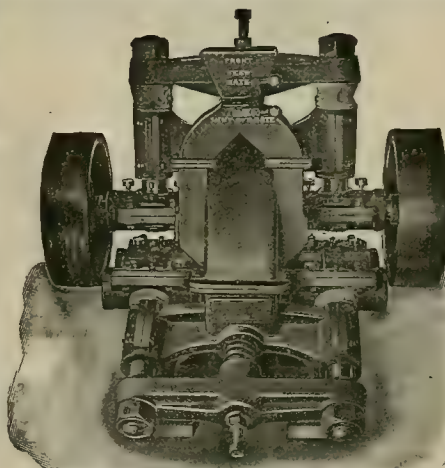
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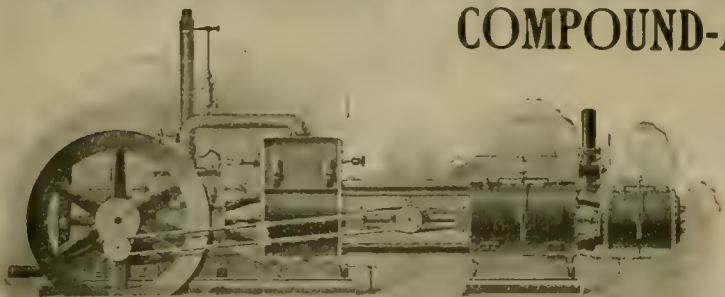


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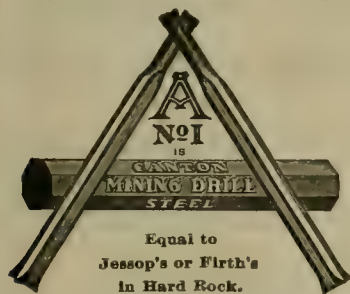
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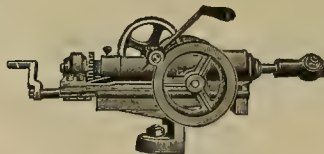
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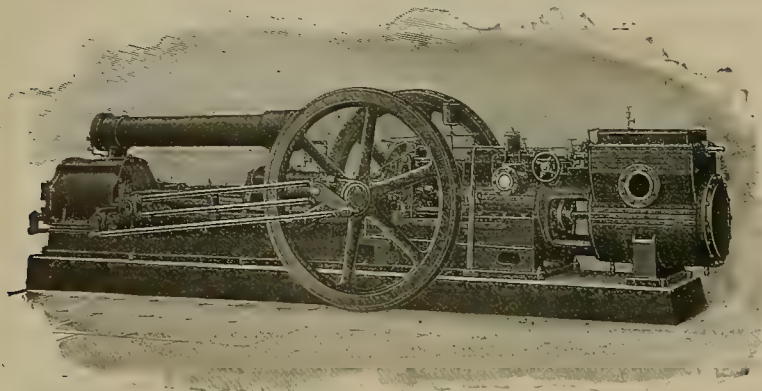
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Our illustration is of a

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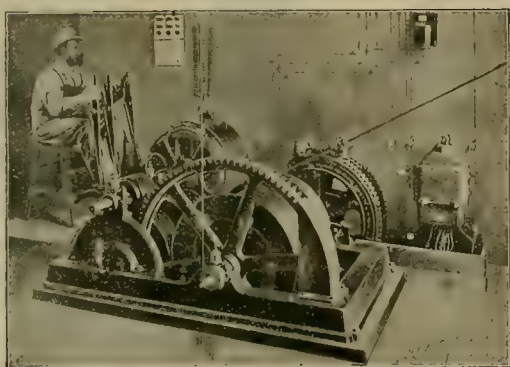
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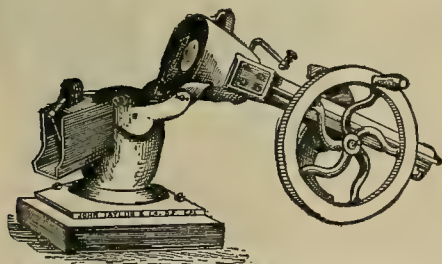
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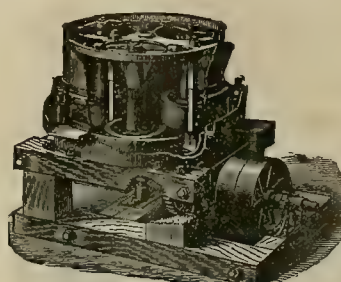
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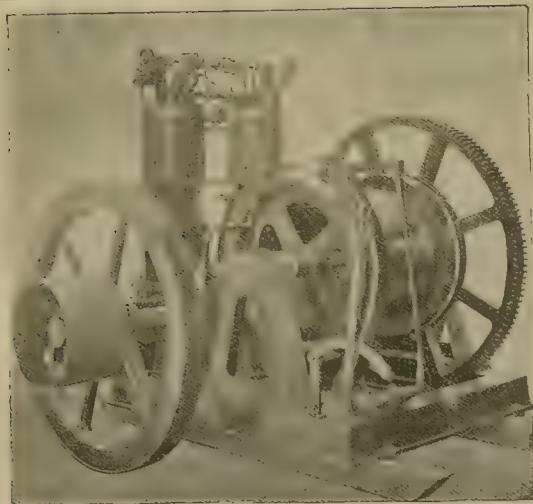
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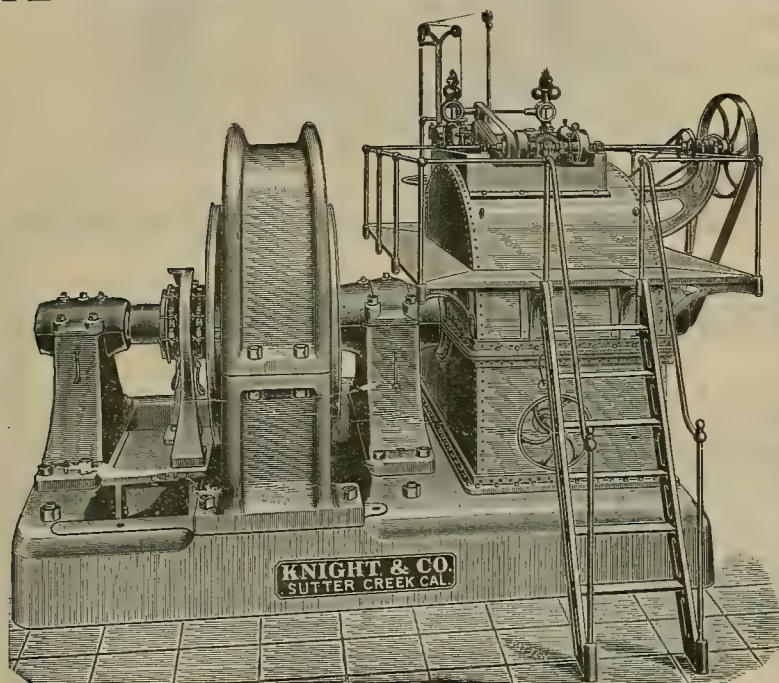
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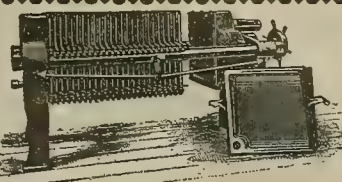
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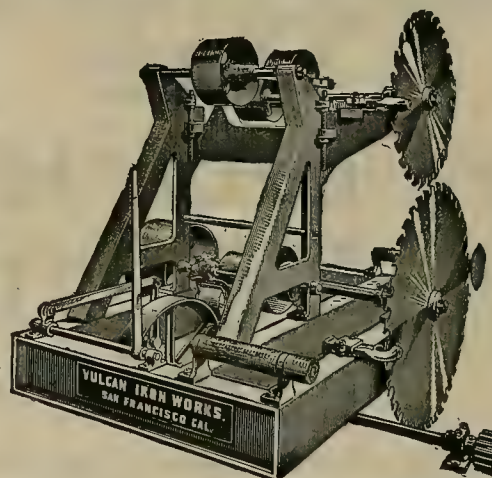
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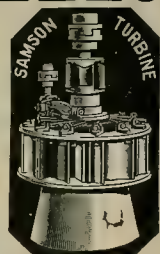
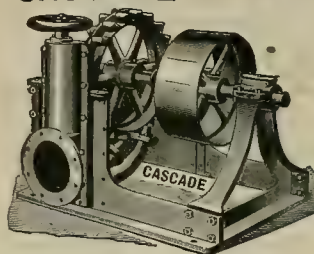
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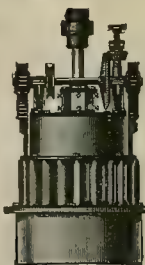
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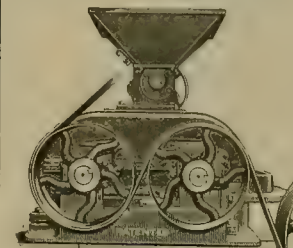
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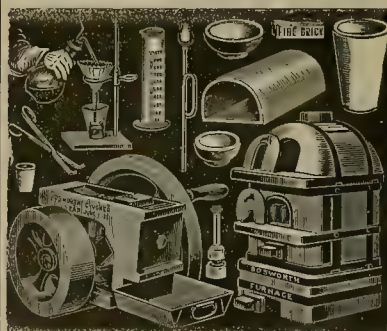
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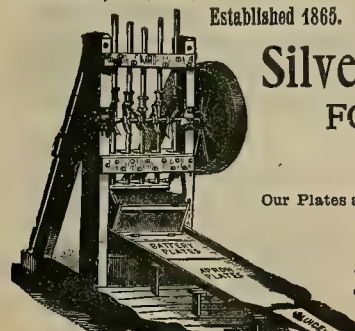
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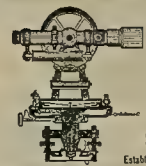
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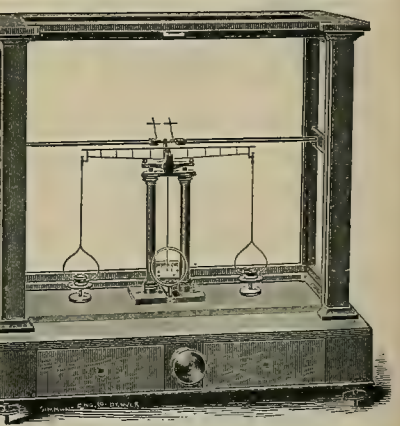
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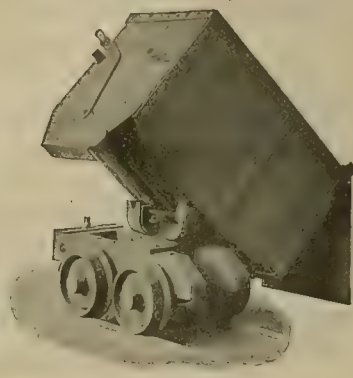
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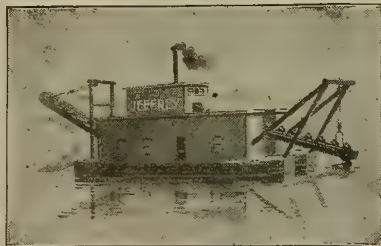


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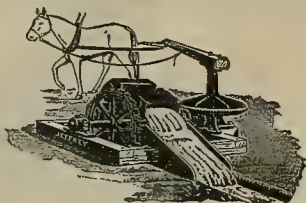


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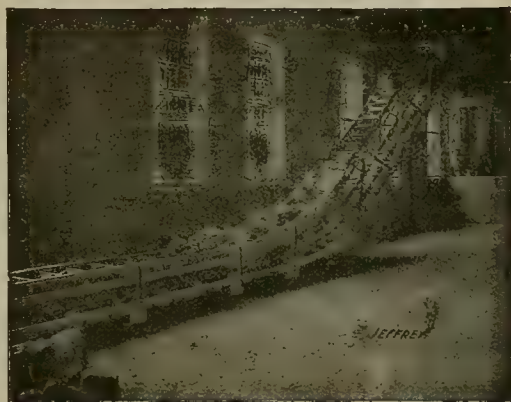
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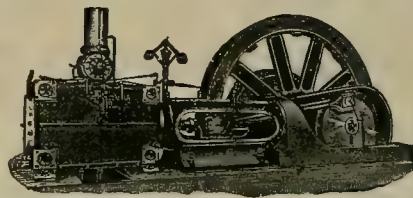
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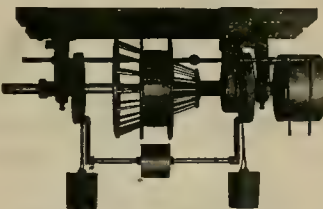
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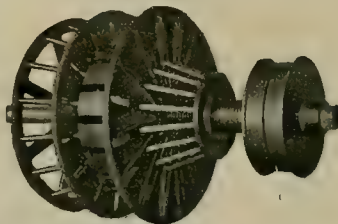
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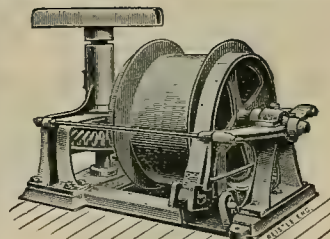
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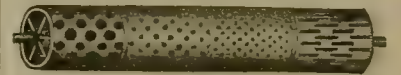


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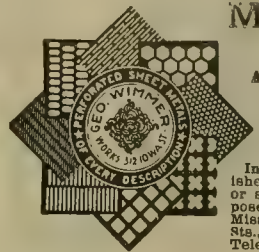
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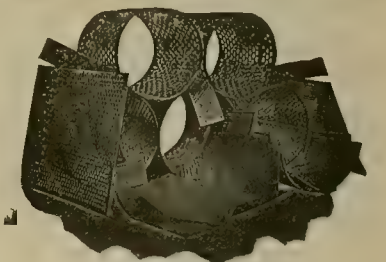
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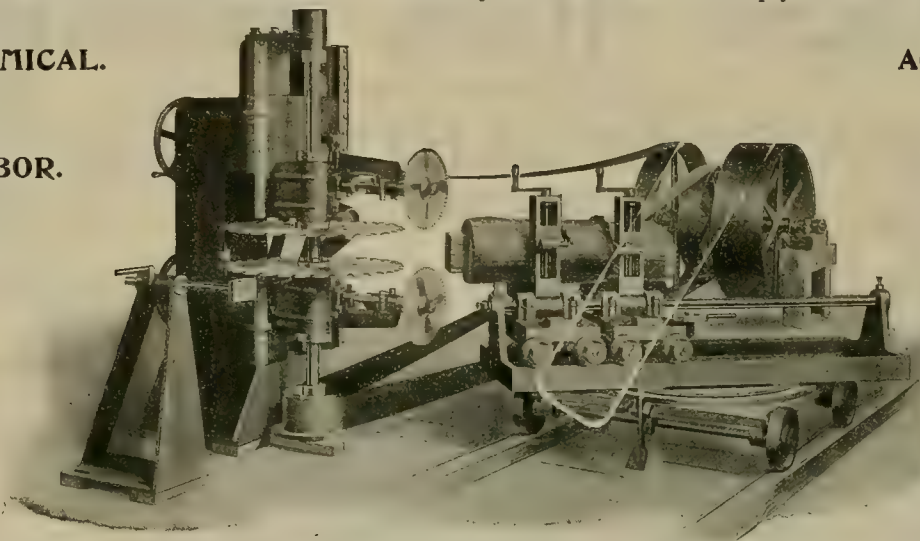
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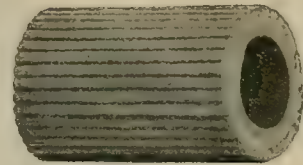
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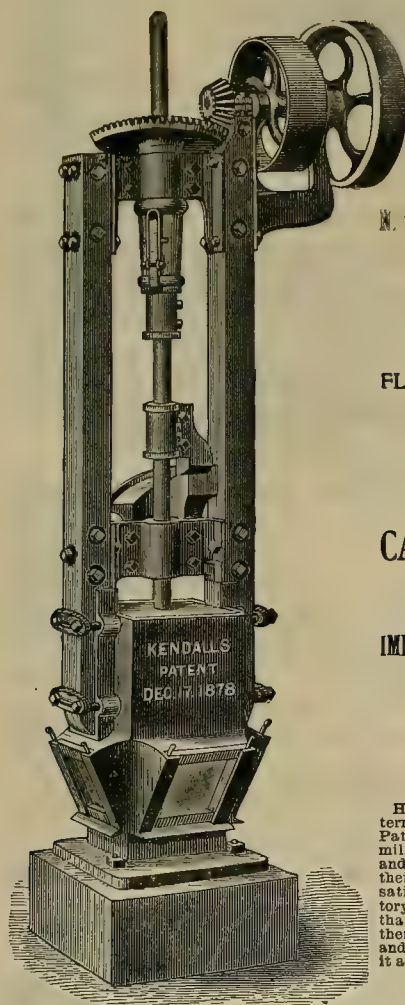
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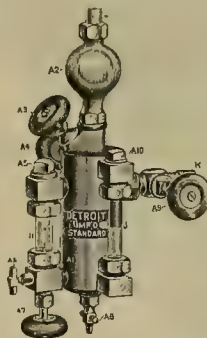
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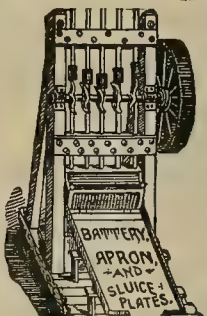
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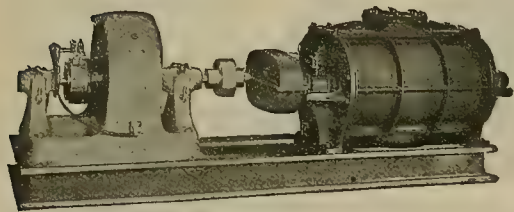
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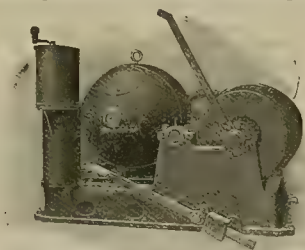
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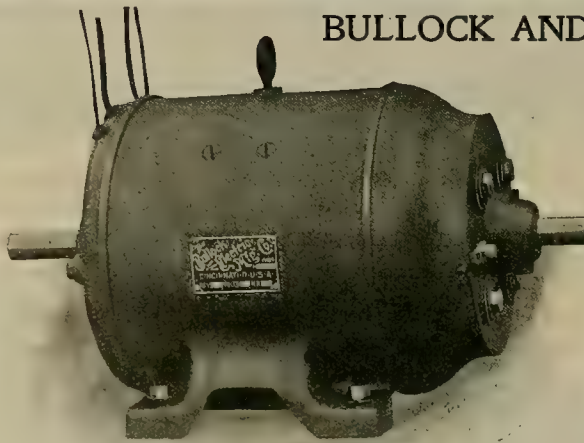
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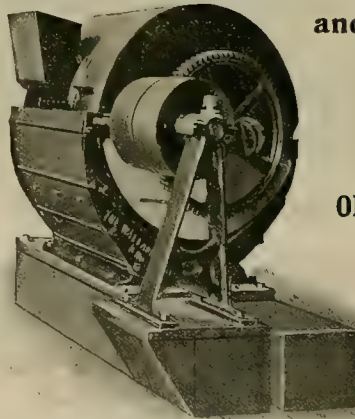
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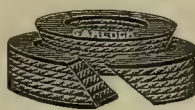
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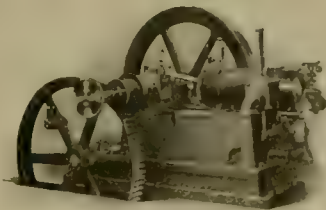
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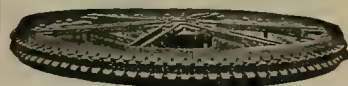
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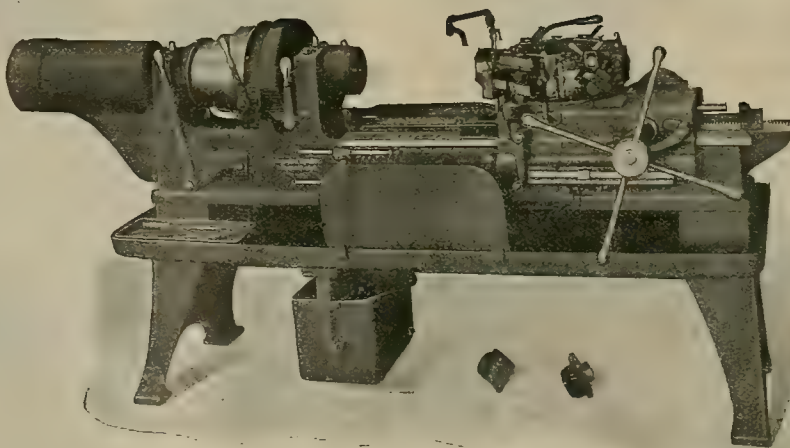
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## The Projected Zinc Mining Combination.

For several months some of the same business interests that had a part in the organization of the Amalgamated Copper Co. and the American Smelting & Refining Co. have been reported as being at work to effect an organization of the zinc producing industry on similar lines. Profits have been high, just as they have in all other metal producing industries, additional capital has been attracted, new mines have been opened, the zinc ores of the silver-lead mines of the Rocky mountain region have become commercially marketable, and the invention of improvements in ore dressing and zinc metallurgy have been numerous and largely successful in reducing costs.

At present all these natural effects of high profits have produced their natural effects in an increase of production, which, if not exceeding consumption, is about to, and which is certainly tending to reduce sale prices and lower profits. A combination of part of the producers to maintain profits, it would seem, would be simply setting another cause at work to reduce them. The effects of the combination theory applied practically to copper and lead production should certainly be educational to those interested in zinc production. Combinations to control and limit the exploitation of minerals, the deposits of which cannot be fully monopolized, must in the end fail of their purpose. In such combinations each separate interest joining is taken in at a valuation which is intended to be more or less a capitalization of anticipated profits. To get the profits, prices must be kept up, and the best possible incentive to competition provided.

Zinc producers will do well to keep free from an industrial combination. If overproduction reduces prices, the natural effect will be to limit production by making some of the mines unprofitable and thus cause them to close down. The better mines then have the market to which they are legitimately entitled. The loss to them on their product will be much less in competition with each other than if joined with poorer propositions in a combination.

There is the beginning of what will likely become a very large and profitable zinc mining industry in Colorado and Utah. Those interested in its success



Brookshire Mine, Near Jerome, Arizona. (See page 283.)

will find it promoted most effectively by each striving for an individual success. A combination on the lines projected is more likely to divide losses than profits. On the other hand, a combination of the miners by which they reduce to metal the ores they produce would be commercially advantageous to the miners.

THE tremendous increase during the nineteenth century in the use of metals and minerals stored beneath the surface of the earth has been something prodigious, and has raised the work of the miner to the dignity of a profession equal in value and importance to any other department of human effort. Tin and quicksilver production are on the decrease, and platinum is not produced in quantity sufficient to meet the demand. California has almost a monopoly of the domestic quicksilver supply, and the southern portion of that State is as famous for its tin deposits as the northern portion is for platinum.



Empire M. Co. Mill, Groom Creek, Arizona. (See page 283.)



Poland Mill, Providence, Arizona. (See page 283.)



Mill of Dividend M. & M. Co., Chaparral, Arizona. (See page 283.)



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## A Review of Mining in 1901.

It is quite the fashion, and indeed almost a mental habit, to measure any industrial progress by its statistics, and conclusions are ordinarily based on comparisons of totals and averages. Quite surely these statistical numbers tell part of the history of an industry, but it may well be questioned if they can tell it all. Going behind the returns will frequently disclose the returns as meaning something different.

The year 1901 in mining is one of the years in which the figures we call statistics do not truly measure progress in the industry. They measure some kind of progress, it is true, but in some directions not the kind that one likes to record of a great primal industry of civilization. It is the present end that counts, for this temporary end is the stepping off ground to the future.

Statistics, when fully gathered and tabulated, will undoubtedly show that the production of mines in the United States in 1901 has been greater in quantity and larger in aggregate sale value than any preceding year. Yet in three important metals the effect of this greater production and larger sale value leaves their future production under commercial limitations due to an already established lower sale price level. The average sale value this year of these metals, copper, silver and lead, has certainly been commercially satisfactory, but the sale value in December, the last month of the year, can not be so regarded when the anticipated business of 1902 is being considered.

Broadly, progress in mining in 1901 is divisible for consideration into progress in the technology of the art, and progress in the commercial exploitation of it. In the former there has been a steady and highly satisfactory advance. With the year's successes in solving some of the problems brought to it from the preceding years' experiences, the workers have a right to be self-congratulatory. In the commercial exploitation of the industry the net results cannot be regarded as satisfactory. Speculative conditions have been created which have induced wasteful investments. The sum total of the capital invested in the exploitation of copper and lead-silver mining has been increased out of proportion to the profit income that this mining will pay for some years to come. Based on artificially high prices, the latest of these investments must adjust themselves to prices, which have some relation to the cost of production.

Gold mining in 1901 has been a steady commercial business. Operators, having practically no concern as to sale prices, have been engaged in effecting economies which, increasing the efficiency of labor, lower the cost of production. The average cost of producing gold is certainly lower at the end of 1901 than it was at the beginning. In part this is apt to be overlooked, as reductions in the cost of production simultaneously bring within commercial reach gold-

bearing deposits that before costs were reduced were unutilizable. Mining has been improved and cheapened by a more general use of vertical shafts in lode mines, by the more general use of power drills, and by the much extended use of electric power transmissions. In placer mining the employment of dredgers has become more general, and the costs of operation have also been reduced by the use of electric power. The average production of units of gold-bearing rock to the unit of day's labor of the miner has been increased more than his wages. In milling and reduction the cyanide process has been much more widely applied. In South Dakota and Montana, particularly, this process, as installed in 1901, will result in a large increase in production and profits during 1902 and afterwards. Lesser economies and reductions in cost have been effected by the use of conveying machinery and in improvements in the detail of concentration methods. Both gold mining and milling are becoming more exclusively mechanical, more efficient to the end desired, and cost less on the average than at the beginning of 1901.

There have been no sensational discoveries of new placer gold fields during 1901. Some discoveries have been made that may become sensational in 1902. The same statement is to be made of lode gold mines. There are as yet no new gold fields though some notable discoveries that may become gold fields in 1902. There has been a marked widening of the limits of old gold producing districts everywhere and some notable examples of successful re-exploitation of supposedly worked out mines.

Copper mining started in the year 1901 on what was generally supposed to be a permanent foundation of a high profit in the industry. The first half of the year was passed without any condition developing to disturb this supposition. The enormous profits of 1899 and 1900 continued to be made. The capital of investors who waited for this proof of permanence of conditions before investing commenced to flow into the industry. It was not until the middle of the year that decreased exports from the United States commenced to attract attention. Later this was followed by reports that enormous stocks of copper were being accumulated as a result of the effort to maintain the price. Evidence that could not be controverted showed that copper was being imported into the United States, being worth more here than abroad. Marked efforts to restrict production followed. Finally in December the inevitable was permitted to happen. Copper mining stocks shrunk enormously in sale value on the exchanges. The largest copper mines in the country were shut down to restrict production. The market price of copper secretly cut under for months past, was openly cut from 17 cents a pound to 13 cents, and there is no reason to anticipate that it will not go lower. The net results to the industry are, first, a timidity, instilled by experience into capital, which will shut off investment and development of new mines for some time to come. Second, a reduction in market price of the metal that wipes out the entire earning power of enormous sums invested in copper mining, in Michigan particularly, in the Western mining States to a less degree. This reduction to the older producing companies means less: they have had abnormal profits and can even under the changed conditions earn normal profits. And third, most serious of all, thousands of miners have been deprived of their occupation. On these men the temporary collapse of the industry they have been dependent on means serious loss and hardship. Forced out of copper mining they are forced as competitive laborers into other branches of mining and thus spread an evil that they are not responsible for beginning.

Silver and lead mining are so closely connected that they are to be considered together. Practically the same of affairs exist in this industry as in copper mining. Abnormally high market prices for lead had made the business attractive to capital for two years past. At the beginning of the year the stability of the enlarged industry was firmly believed in. As with copper the first half of 1901 went by with nothing developed to suggest more than a warning to anticipate the future. The last six months have duplicated the story of copper in the same period. December has witnessed as with copper the open recognition of the real conditions. It has witnessed precisely the same commercial and industrial

effects. The separation of the mining portion of the industry from the ore reduction portion and the concentration of the latter has resulted in an enormous curtailment of lead-silver production in the United States, accompanied with lower prices for what is produced. It is notable that the price of lead in the ore has been reduced a third more than the market price of the metal to consumers. The smelting and reduction company is continuing its business by treating foreign ores, which it can buy still cheaper than the American, and can export, with recovery of duty paid on import, thus preventing their production coming into competition with the accumulated stocks of the United States production they now hold. Meanwhile the same serious effect on the working miners exists. It is reported that in Colorado between 6000 and 7000 miners have been thrown out of employment indefinitely in the production of lead-silver ores.

The conditions of the three industries of copper, lead and silver mining are clearly to be attributed to what is called by the men who are responsible, the industrial reorganization of these businesses. The methods employed have been those of speculation rather than legitimate industry. They first created artificial profit and then capitalized them into paper which they have since exchanged for the coin of the public. The business of reorganization has been a commercial success to them. The industry they reorganized has been brought temporarily to the verge of commercial failure.

The feature in the situation in which there is hope is in the improvement made during the year in the technical practice of the mining and reduction of these ores. Costs have been materially reduced. The average unit of ore costs less to mine and reduce at the end of 1901 than at the beginning. With copper, lower prices will bring very much wider uses. In a little while these new uses, added to the old, will absorb the production of all the mines, old and new alike. Profit may not be so large per pound of copper, but more pounds will be consumed. With lead and silver not so much in this direction is to be expected; the lowered prices are not likely to create new consuming markets. The open road here lies with the mine owners building and operating their own reduction plants. If they owned such plants now there would not be 10,000 idle lead-silver miners, while the cause of the injury continued its business uninterrupted and maintained its profits by reducing foreign-mined ores.

In the mining of the minor metals the operations of the year have been satisfactory to all concerned. These industries have been fortunate in being comparatively insignificant. They have not been large enough to stand reorganization yet.

The mining of 1901 has its lessons to 1902 which its statistical figures of totals and averages would fail to disclose. Chief of these is the obvious deduction from the failure of reorganization, call it consolidation or anything else, to permanently benefit the mining industry. Next in importance is the practical demonstration being made that the miners of the metals can increase the profit margin of their industry by becoming manufacturers of metal as well.

THERE is always money for mining investments, but many would-be investors fancy that nothing but a developed mine should have money put into it. The real miner knows that this is often a mistake. The men who have made the most money out of mines in this country have not done so by buying developed mines at full value loaded with commissions. The great fortunes of Haggin, Tevis, Mackay, Walker, Hayward, Hearst, Clark, Stratton, Cruse, Daly and a hundred others were made by developing prospects into mines. That is the way big money is made in mining; that way lies the profit.

DATA of mine costs are always interesting to practical miners, furnishing valuable information. While usually getting out the ore, transportation, treatment and "general expenses" are among the solely detailed items, the information is not complete. Costs of timbering, pumping, drifting and dead work are of rarer publication, and the latter, when given, is generally charged to "development," though a more rational system of mine accounts would suggest charging dead work to capital account, inasmuch as it represents just so much cost of the mine.



## Concentrates.

CELLULOID can be softened and moulded by pressure under heated oil.

A 60 H. P. ENGINE will use about seventy gallons of gasoline per ten hours.

THE simple solution of any substance in water is always accompanied by a cooling of the water.

IT takes 7½ pounds coal, 15 pounds of dry wood or two quarts of fuel oil to evaporate one cubic foot of water.

A MINOR can legally acquire an interest in a mining location as a locator, but under the law can not dispose of such interest.

AN electrical furnace cannot be used for melting metals at a low temperature. Its heat is so intense that the metals would be burned.

A GOOD WELDING COMPOUND is composed of bicarbonate of iron, 4 ounces; crystallized ammonia, 3 ounces; pulverized borax, 1½ pounds.

A COLUMN of water 43 feet in height will exert a pressure of 18½ pounds per square inch. The rule for any height is to multiply the height in feet by 0.434.

WROUGHT iron pipe 4 inches diameter on the inside has about 1 square foot of inside surface to each foot of length, and will weigh about 10½ pounds per foot.

THERE is a constant relation between the circumference of a circle and the side of a square of the same area. The former multiplied by 0.282 always equals the latter.

SAN FRANCISCO BAY consumes about 200,000 tons pig iron annually, nearly all American, half coming from the East by rail and half by Cape Horn. It is worth in San Francisco \$21 per ton.

A FEW drops of coal oil applied to the hands up to the wrists, and on the ears, neck and chin, will do more to avoid the numbing effect of cold in those parts than all the clothes one can put on.

ONE TON of tin scraps and clippings will yield about 55 pounds of tin, which is secured by treating the scrap by an electrical or chemical process. The Vulcan Metal Refining Co., Sewaren, N. J., so treats tin scrap.

So far as "Concentrates" knows, the only copper converters in present operation on the Pacific coast are at Bully Hill, Shasta county, Cal. The Mountain Copper Co.'s, at Keswick, Cal., are in course of construction.

AFTER a long stop, or when ores containing much free iron is being milled, spots resembling grease will form in the plates, in which case a weak solution of cyanide, or, preferably, a little caustic soda, may be used with good effect.

NO originality is claimed for any of these paragraphs. They are for the most part attempts to answer questions weekly received from "all over," and are made as concise as possible in essaying to accurately give the desired information.

MINE tunnels in hard rock have been driven as much as 100 feet a month by hand. From 60 feet to 80 feet are ordinary rates of advance. Using power drill, as high as 300 feet advance has been made, and from 230 feet to 260 feet records of progress are ordinary practice.

SODIUM NITRATE is a grayish white substance, soluble in water, and when ignited burns vividly with a deep yellow flame. It consists, when pure, of 36% soda and 64% nitric acid. It is in demand commercially in the manufacture of gunpowder, dynamite and nitric acid.

THE duration of sunlight at Dawson, Yukon Territory, Dec. 21st, is three hours and thirty-five minutes. At 12 noon that day the sun is five times its own diameter above the horizon there. At midnight, June 21st, it is five times its own diameter below the horizon there—Nor. Lat. 64° 4'.

NO plate or bars of either steel or iron should be worked at a black or blue heat (say about 500°). The material will stand far more strain either red hot or cold, while at an intermediate point great risks will be run, and possibly strains produced which will result in rupture later on.

UNDER U. S. MINING LAW the possession of the surface of a mining claim is the possession of all veins having their apex within its surface boundaries, although in their course downward such veins may pass beyond the vertical side lines of the location and beneath the surface line of an adjoining claim.

WHEN A BATTERY of cells is used as a source of electric energy, the constant element in the circuit is the E. M. F., while the current depends upon a variety of external conditions. The case is reversed on using an influence machine driven at a constant speed, for then the mean current is the constant element, while the E. M. F. is a dependent variable.

A PAY LEAD in a placer mine is a portion of an old stream channel. If the pay disappears sharply it is a good idea to examine the country ahead on both sides of the lead. The chances are that the continuation of the pay lead is in a high bar or bench. This may be entirely unsuspected, but it is advisable to examine the ground thoroughly regardless of opinions.

A SOLID has no latent heat. When liquefied by heat this heat becomes latent. What is sometimes styled the latent heat of a solid is the quantity of heat required to

melt it. This is not given to the solid except at the temperature at which it melts. When a solid is heated to its melting point its temperature stops rising and all the heat which enters it is spent in changing the condition of the solid to the liquid.

IN estimating the quantity of water a large riveted sheet iron or steel pipe will deliver in a given time, allowance must be made for the projecting rivet heads reducing the area of the cross section of the flow. The amount to be deducted from the pipe diameter to compensate is two and a half times the depth of the projecting heads for low velocities and three times the depth for velocities over 5 feet per second.

PLACER GOLD, sufficiently coarse to be known as fine scale gold, is rarely found more than 5 or 6 miles from its source. Fine flour gold and thin flat scales are carried further. If a placer deposit carrying coarse gold is found to extend unbroken for more than 5 or 6 miles it may be safely assumed that the erosion that has made the placers has cut two or more lode sources, or that the country rocks are themselves gold bearing.

THE U. S. CIRCUIT COURT decided in the Colorado case of Nelson vs. the Champagne M. & M. Co. and V. Z. Reid, that no assessment work need be done on mining claims after the owner has received the certificate of the Receiver of the District U. S. Land Office. The Court also ruled that the ownership of the mine dated from the issuance of the Receiver's certificate, and that at that time the Government control of the property passed absolutely to the claimant.

STAMPS suit the Lake Superior copper ores, which are amygdaloids, carrying the copper in small particles chemically pure. And when the rock is crushed they merely separate the pure metallic copper from the gangue which contains it. The Butte, Montana, ores are sulphides, the copper being chemically united with sulphur and other elements, and crushers substituted for stamps give more satisfactory results, the stamps in this latter case making too much slime.

"J. H. T" SHOULD not attach too much importance to the rulings of some California Superior Courts, which are erratic. Recently an Alameda county judge held that a certain tract of land "could not be considered mining land, because the mining thereon had been done at a loss." Were this rule to hold, the area of mineral land would be materially ensmallled. The California Supreme Court can, however, usually be depended upon to correct the vagaries of the lower courts.

THE exterior lines of a mining location are not in themselves property, but are mere boundaries or instruments of description. They do not give a right to all that is embraced within them, but instead so much thereof as is public land and subject to disposition by the United States. Mining improvements may be placed upon adjoining public or private lands and need not be upon the land actually claimed. This is equally true of location lines so long as private proprietors do not complain.

A SHELL BOILER is one composed principally of plates arranged in the form of a cylinder and riveted together, and provided with suitable heads riveted to the plates into which the ends of the tubes or flues, as the case may be, are secured. A flue boiler is one composed of plates arranged in cylindrical form and riveted together, having suitable heads riveted to the plates into which the ends of from one to six flues are secured. The tubular embodies the same construction as the flue boiler, except that a larger number of tubes are substituted for the flues.

A TRIAL COURT in California made a rule that where the assessment work on a mining claim was commenced on the 31st day of December and continued until the \$100 expenditure was completed, work not being required on Sunday, the assessment work so made counted for the year in which it was commenced, and protected the claim from forfeiture. The decision of a trial court is not final. The same question can be litigated in another action and the reverse decision made. It is better to be safe, and have the work done before the year expires at midnight on December 31st.

WHEN boilers are to be left idle for a long time they should be thoroughly cleaned, as soot collects and holds moisture, so that corrosion goes on underneath the apparently harmless covering until the plates are ruined. A coat of good paint suitable for ironwork will assist greatly in preserving the boilers out of use, and as the expense of it is small, it does not pay to neglect it, for good second-hand boilers are frequently wanted by men who do not care to invest in new ones; but when corrosion is allowed to eat into the tubes and plates they will soon be fit for the scrap heap only, and are not especially valuable even there.

AT PEUBLO, COLORADO, the Guggenheims, and later, the A. S. & R. Co., made a practical success of oil fuel in lead blast furnaces. So also has the Selby Smelting & Lead Co., at Selby, Cal. Coke makes an excellent blast furnace fuel when hard, porous, low in ash and free from dust. The percentage of coke used depends on the ore, the flux and the blast pressure. The richer the ore in lead, and the more fusible the gangue and flux, the less fuel needed. A strong blast, causing better combustion, makes less coke necessary. The average quantity of coal is from 10% to 15% of the charge, for matte smelting from 15% to 18%. The higher the altitude the more fuel required. Charcoal well made from hard wood does

well in small furnaces. Three parts of coke and one of charcoal make a good fuel for lead smelting. A mixture of coke and non-caking coal works fairly well where no copper or arsenic is present in the ore. Wood is nearly always unsatisfactory.

THE creeping of a belt is due to stretching. For every foot of belt that goes on the driver less than a foot goes off and goes on to the follower. If the diameters of the pulleys were equal the driver would make a greater number of revolutions in unit time than the follower would. If there is much stretch in the belt there is a loss of speed. This loss amounts to from 1% to 3%, depending on the belt's elasticity. Since the tension on the belt is kept as low as possible to prevent too much friction on the pulley bearings, the belt that has the least amount of elasticity at low tensions is the one which is the most valuable in this respect.

IN the Rlecan process for the recovery of gold from sulphide and telluride ores in Western Australia iron tanks are employed, these being 11 feet deep, 12 feet long and 8 feet wide, and lined with removable copper sheets. There are two such tanks which are capable, jointly, of treating sixty tons of material per day. The operation consists in agitating the prepared products in the tanks with a dilute solution of cyanide, and conducting through the vat a current of electricity, which deposits the coarse and fine gold as an amalgam to be converted into marketable form. The advantages of the process are stated to be that the gold is recovered in one operation, no after process being necessary.

THERE are two kinds of fans in use in ventilating plants—the centrifugal fan, or blower, and the propeller or disk fan. The former consists of a wheel with several vases mounted on a horizontal shaft and in a carved casing of wood, brick or iron, the air entering through an opening in the center and forced to the outlet by the centrifugal action due to the rapid revolution of the fan wheel. The disk fan is mounted in an opening in a wall, or in the end of a pipe, and drives air by means of its screw action. The centrifugal fan is considered more positive in action especially under pressure, though its delivery is sensitive to variation in such pressure. Air is a good deal like a rope: it is easier to pull it than to push it.

A STEEP grade to the undercurrents of a placer mine is preferable to a very flat grade. The latter is pretty certain to cause a "sanding" up of the riffles, so that the fine gold which the riffles should stop never comes in contact with them. The undercurrent with a flat grade also requires a relatively large volume of water to keep the sand moving, which interferes with the settling of the fine gold. A very steep grade will not sand, and so shallow a depth of water is required to keep the material moving that the gold comes in contact with the riffles, and, checked in down-stream motion, has an opportunity to sink into the dead water and quicksand beneath the thin flowing stream.

TO KEEP a boiler free of incrustations, caustic soda or potash lye is used with good effect. Dissolve one-quarter pound of the soda or lye for each horse power of the boiler in a barrel or tub of water and connect it with the suction of the feed water pump. Use the boiler for a day with the soda in. Then blow out from the boiler after the fires are drawn or banked, or when the engine stops, to the level of the lower gauge cock, or bottom of water gauge, and pump up with fresh water to high water mark. Use the boiler next day as usual, and at night, after fires are drawn and walls cooled below the temperature of possible injury to the boiler, blow out all the water and clean out the boiler. This may be repeated, according to the condition of the boiler, once or twice a month.

THE ownership in a mining claim of undivided interests by two people does not make them partners. They are co-owners. Partnership is a matter of agreement. Co-owners, by an agreement, can form a mining partnership. If A, as a co-owner, bonds his half interest in a mining claim without consideration that is entirely his affair. The action of A does not bind B, who owns the other undivided half interest. If B bonds his half interest for a consideration, irrespective of the nature of the consideration, whether money or its equivalent in assessment work, the whole of it belongs to B, and he is not compelled to divide it with A. If the consideration was fifteen days' work, estimated to be half the amount required, it all inures to B's benefit, and A must perform the other half. The other half must be performed, too, otherwise the location becomes forfeit.

SOME TIME AGO the Commissioner of the General Land Office ruled that thereafter when mining claims conflicted there could be no compromise between the claimants. The practice of the courts has been, in cases where claims have been in conflict, to permit the contesting parties to agree upon a division of the territory in conflict, each taking such portion as may be just and equitable under the conditions prevailing. The Commissioner ruled that if a contestant has a right to a portion of the ground he has a right to the whole of it, and has no right to compromise the case pending a decision of the land office. This ruling would prevent two or more contesting claimants from uniting their interests and uniting both their claims. Such a law would act as a hardship in some instances, but upon the whole would work a benefit, as it would put at rest the question of first ownership in full, and save the possibility of much litigation. So far as "Concentrates" knows the matter has never received final determination.



## Some Yavapai, Ariz., Mines.\*

[STAFF CORRESPONDENCE.]

**GROOM CREEK DISTRICT.**—The Monte Cristo, managed by H. Blauvelt, will have its new 5-stamp concentrating mill in operation by the last of December. In the mine considerable development has been done since last spring and they have quite a tonnage of shipping and milling ore on the dump and in sight in the mine. The shaft, equipped with steam hoist, is 200 feet deep, with two levels opened. The vein courses north and south and is an iron-lead streak, ranging from 6 inches to 28 inches wide, the values being silver, gold and lead. A peculiarity of the ore is the presence of considerable wire silver. The rock carrying this is sorted on a canvas and sacked. Foreman W. H. Mackay estimates that one-tenth of the output is shipping ore, which will average \$60 per ton; the mill ore will run about \$40, and four tons of this will be concentrated to one ton.

The Empire Extension, in charge of James O'Connell, is under development. It is equipped with a steam hoist.

The Home Run group, owned by the Niles M. Co. of Niles, Ohio, has been developing since last spring, the main shaft being now 400 feet deep, with three levels opened. The vein crosscuts the syenite and porphyry formation, coursing north and south, and is about 18 inches wide at the surface and 3 to 4 feet at the 300 level. The ore carries galena and pyrite, with gold and silver values. There is considerable oxidized ore near the surface, and Manager D. Monahan states that while generally a concentrating ore, a large percentage of the values can be saved by amalgamation. The erection of a mill on the property next year is being considered. The shipping ore on the dump is said to run \$80 to \$150 per ton, the mill ore not less than \$20. The Home Run shaft supplies water enough for steam making and milling.

South of the Home Run is the Gold Basis group, in charge of M. H. Dodge, one of the owners, and Supt. Van H. Brooks. The group comprises four claims, opened by 1000 feet of work, with a 5-stamp concentrating mill on the ground. The main shaft is 110 feet deep, with a steam hoist, and there are three tunnels aggregating 500 feet. The claims cover two parallel veins. Some of the work discloses a 12-inch pay streak. This company is made up of Cleveland, Ohio, people.

The Empire is a well developed property, owned by a company of which Dr. W. A. Hendryx is president and manager. The shaft, now at 400 feet depth, is to be sunk 100 feet deeper. The north and south vein is opened up on the 85, 200 and 400-foot levels. The ores are oxidized from the surface to about 300 feet depth, the works getting into the sulphides at the 400-foot level. The vein walls are about 17 feet apart on the 400 level, within which is a 6-foot ledge of ore next to the hanging wall. The gangue rock is a rotten porphyry with quartz, the walls being syenite. The principal values are gold, which in the oxidized ore is quite free milling. The mill (an illustration of which appears on the front page) runs about forty tons daily. It is equipped specially for amalgamating. The material passes from the stamps over plates, thence to storage tanks, draining from the latter into circular agitating tanks with plated bottoms, currents of electricity being passed through the pulp to precipitate the gold. F. E. Mansfield is Supt. and E. Laube millman.

Near the summit, between Groom creek and Lynx creek, are two adjoining properties—the Midnight Test and the Dutchman—both bonded to G. Wood and associates of Prescott. The first is owned by Maj. Pickrell, the second by C. W. Sauer and F. Fierthaler. Both have steam hoists and are considerably developed. The Midnight Test shaft is 375 feet deep and that of the Dutchman 210 feet. Mr. Wood is erecting a small stamp mill on the first named.

**BIG BUG DISTRICT.**—The Poland M. Co., of which C. J. Stone is manager, having a group of thirty-two claims extending from Big Bug gulch across the mountains to Lynx creek, is continuing development and erecting a concentrating mill. The base of operations is on the Big Bug side, some 3 miles above the town of Providence. The feature of their underground work is the Poland-Lynx creek crosscut tunnel, which starts in about 50 feet above the mill on the Big Bug side, and cuts the main vein about 650 feet below the apex. When finished it will be double tracked its entire length of 8000 feet. It is claimed this tunnel will cut twelve well-known fissures. Its greatest depth below the surface will be about 1200 feet. The work is proceeding with air drills and the heading is now in 830 feet. The group has now 7500 feet of tunnel work and drifting. The fissures strike north and south and dip west at about 75°. The tunnel referred to cuts the main vein at 800 feet from the entrance and drifting on it has been commenced. They are also sinking a shaft at a point on the south drift to develop the ore body at greater depth. The old Poland tunnel, 230 feet above this main crosscut, is in on the vein 2100 feet. The new mill, which will soon be completed, has twenty stamps, with steel

anvil blocks and concentrating tables. The ores are considered suited to concentration.

The Big Bug branch of the Prescott & Eastern Railroad is being built from Huron station, via Providence, to the Poland group, and will doubtless be operating within the next thirty to sixty days.

Up the gulch, above the Poland, a number of claims are being developed by J. Gray and others, whose work shows an iron-lead ore in syenite country rock. At Providence it is reported that Supt. E. A. Powers of the Red Rock is soon expected back from the East to start up the mine.

The Annie mine and mill are now in control of J. Gillespie, who states that he will sink the shaft from 385 feet, its present depth, to 700 feet.

The tunnel on the Oriental group, now in 2000 feet, is being advanced and will soon be completed. A 400-foot drift was recently run on the vein to connect with an upraise of 300 feet from the tunnel level.

T. W. Boggs has a 200-foot shaft on his Butternut group, with a considerable amount of drifting in ore, which averages about 4½ feet wide. The vein matter comprise oxidized and sulphide copper ores. Shipments made this year are said to have run 12% to 14% copper. Mr. Boggs states that he has shipped forty cars of ore since the property was opened.

**MCCABE AND CHAPARRAL DISTRICTS.**—The McCabe mine now belongs to the Model Gold M. Co., F. Jager president and E. Caster of Chicago secretary. P. A. Johns, general manager, states that at present an overhauling and remodeling of the mill and cleaning up of the mine is being done preparatory to further development of the property. The shaft is 700 feet deep, with several levels opened. The ores are iron and copper sulphide, carrying gold, silver and copper values. The erection of a new mill is understood to be under consideration.

The McCabe Extension, adjoining the McCabe proper, has recently been started, having now a shaft house, steam hoist and good office and boarding house. A shaft has been sunk 200 feet, from which crosscuts have been run to the ledge at the 100 and 200-foot stations. The intention is to sink to 300 feet and open the ore body also at that depth. R. Ling of Prescott is manager, J. H. Farrell being foreman in charge.

The Gladstone mine, adjoining the McCabe on the same lode, is owned by the Idaho M. & D. Co., of which Col. D. N. Hood is president and C. W. French manager. Good buildings, a steam hoist good for 800 feet depth, dynamo for electric drills and other equipment have been provided within the last six months, and a two-compartment incline shaft sunk 260 feet. An electric drill is operating on the 100-foot level in drifting and another at the bottom of the shaft for sinking. From the old shaft to the east of the new some 2000 feet of work has been done. The ores are iron and copper sulphides, the chief values being gold and silver. Some shipments have been made. It is said the erection of a reduction plant is being contemplated.

The Rebel and Kicker group, still farther west on the McCabe lode, belong to the Pride of Arizona Copper Co., J. P. Darling manager. The Rebel shaft is 750 feet deep, with a good deal of drifting on the 400, 500 and 600-foot levels; and a station is being cut at the 700. This work shows the vein to be 3 to 4 feet wide, carrying a vein of ore which runs 10% to 13% lead, 4% to 10% copper, \$10 to \$20 gold and seven ounces to eight ounces silver to the ton. The Kicker shaft, 300 feet deep, with 500 feet of drifting, shows much the same conditions.

The Silver Belt mine, east of McCabe, near the Agua Fria river, is also under Mr. Darling's management. This property was located in 1870, patented in 1885, and was at that time a considerable shipper of galena ore. The old workings went to the depth of 250 feet. Under present management new machinery has been put in and the shaft sunk to 350 feet depth, where a station has been cut, showing ores there to be an iron, zinc and lead sulphide, but low grade and capable of concentration. A concentrating mill is being erected at Val Verde, on the Agua Fria, to concentrate the ores from the Silver Belt, Rebel and Kicker. The mill equipment includes crushers, rolls, screens and tables; and an effort will be made to make a separation of the zinc from the iron.

The Iron Queen, 2 miles south of the Silver Belt, is being developed by E. D. Treadwell. A shaft sinks 165 feet on the vein, which has a north and south trend. The old Boggs mine, worked years ago, is on the same ledge, but farther north. The work here shows copper sulphides and sand carbonates in a ledge 14 feet wide. N. Waldenmeyer is in charge.

The Dividend 5-stamp mill operates steadily, working nine tons of ore run daily. The ores have an iron and lead base, with gold and lead values. It is claimed 50% of the gold is saved on the plates. Values in the finer slimes are saved on the Bartlett tables. The Dividend mine is opened and worked through two shafts—the Ticonderoga, 200 feet deep, with 400 feet of drifting; and the Dividend, 300 feet deep, with 800 feet of development. A force of fifteen to twenty men are employed.

**JEROME DISTRICT.**—Near Jerome the Brookshire copper mine is being extensively developed by E. D. Treadwell and others. On the front page is an illustration of the mine buildings and shaft equipment.

The development work has disclosed in a 700-foot tunnel and in drifts from a 200-foot shaft an east and west vein carrying, it is claimed, 15% of copper and \$10 a ton in gold. The same people are developing several other ledges in the same district, notably the Cliff mine, on which there is an 800-foot tunnel.

McCabe, Ariz., Dec. 7.

WASCOTT.

### The Wynn Process.

**TO THE EDITOR:**—The general opinion of the late Professor Wynn's process seems to be that he was claiming to make gold. This is a mistake. Professor Wynn never claimed he could make gold. His process he claimed to be a chemical discovery that does not interfere in any way with doctrine of the chemical elements. He quoted himself: "I am not making gold, but saving it."

According to his theory, there are great quantities of very fine flour gold in a number of leads. This gold is so fine that it can be detected only with the aid of strong microscopes. When ores of this kind are assayed, the minute particles melt and fume off before the coarser gold melts, and are thus lost for the assayer. Now, Mr. Wynn claimed he had discovered a way by which he was able to save all that fine, microscopic gold. That this seems reasonable cannot be denied. Gold, like any other substance, must evaporate when heated enough. If it did not, why do the smelters deduct their percentage of losses? If it went in the slag, why don't they recover it? The percentage in the slag is, I am afraid, too small. The principal part of it is fumed off with the heat, settling where it happened after it got cooled.

The only way to save it is to gather it, and the only way to gather it is to use substances that will not absorb it. Looking at this, there is a great possibility of success for the Wynn process.

Telluride, Colo., Dec. 19.

H. H. McLEAN.

[The writer has made the very common error of assuming the conclusion that it is intended to demonstrate as the premise of known fact from which the demonstration starts. The fact that is disputed is the presence of the gold under conditions that would not be appreciable to chemical and physical tests. Gold does not volatilize simply because finely divided. Having high conductivity of heat, the entire mass of rock and metal to which heat is applied must arrive at the volatilization temperature at the same time, and coarse and fine gold particles alike must pass the intermediate stage of fluidity together before reaching that of volatilization. None of the commercial metallurgical processes are so refined that they determine absolutely the quantity of gold in a mass of ore, nor can they get it all out. As a rule, very little is lost in slags and less is lost by volatilization. The probability is that none of the latter goes as vapor of gold, but is carried away in the vapor of chemical combinations formed at high temperature in the furnace. These, cooling, disassociate, but leave the gold so fine that it is mechanically carried with the furnace gases for a sensible period of time while it is gravitating downward through them. Volatilization, however, does not occur in wet methods of chemical analysis, and here fineness of the gold does facilitate its certain and rapid detection. Allotropic forms of the elements show different physical qualities rather than chemical. They never conceal the elemental identity to the methods of analytic chemistry. Finally, the spectroscopic method of analysis would reveal qualitatively the minutest traces of gold in any other substance simply through the use made of the phenomenon of volatilization. It could not be missed by this spectroscopic method, even though it was inappreciable to the highest powers of the microscope. The simple fact is that there was no gold where the late Professor claimed there was. The belief that there might be can not stand for a moment, when the error of accepting the truth of the conclusion as the premise for the reasoning to it is eliminated.—ED.]

THE report of George F. Roberts, Director of the Mint, upon the operations of the mint during the year ended June 30, 1901, states the total coinage of the mints as 176,999,132 pieces, of the value of \$136,340,781. Of this \$99,065,715 was in gold, \$24,298,850 was in silver dollars, \$10,966,648 was in fractional silver and \$2,009,568 was in minor coins. There were also coined at the Philadelphia mint 225,000 gold pieces of the value of \$349,014 for the government of Costa Rica.

THE article on page 274 of the issue of the 21st inst., "Saving Platinum, Iridosmium, and Other Platinum Metals," was written by Mr. W. P. Butler, San Francisco, resident manager The Waratah Minerals Co., Ltd., of Philadelphia, Pa., buyers of those metals.

\* See illustrations on front page.



## New Method of Quicksilver Extraction.

Written for the MINING AND SCIENTIFIC PRESS by  
J. H. JORY.

The pre-eminence of California as a quicksilver producer, and as a territory having the largest deposits of that metal, is well known, but there are some facts in connection with recent conditions of quicksilver mining and their relation to existing methods of extraction on which comment may be of interest.

In looking over the reports of the production of our mines the first thing that strikes the attention is the greater cost of production in recent years, as compared with former periods, through the lesser percentage of metal obtained from the ores operated on. At the New Almaden mine, where the work has been on the largest scale and carried on by the most scientific methods, in the years from 1850 to 1854 the percentage of metal obtained from the ore averaged rather more than 30%. In the five years from 1890 to 1895 the ratio had fallen to less than 1½%.

During the first five years mentioned 15,550 tons of ore were worked, with an output of 120,016 flasks of quicksilver. In the latter five years 81,025 tons of ore were worked, with an output of only 48,409 flasks. As will be seen, though the amount of ore operated on in the latter five years was five times greater than during the first five, the quicksilver product had become two and a half times less.

Nowhere else in the world, perhaps, have there been found as large deposits of cinnabar of such pure quality as those worked in the first ten years of operation of the New Almaden mine, and it is not surprising that as the underground workings increased it was found necessary to operate on lower grades of ore. But the condition of things that exists now at New Almaden, where the average output of metal has fallen below 1% in weight of the ore treated, is the same that generally prevails in all the quicksilver mines of the State, although there are always a few bunches of ore to be found that carry higher percentages.

Another consideration which forces itself on the attention is the large number of quicksilver mines existing in the western part of the State, so few of which are producers of the metal, although it would seem that the mining of the ore would be less expensive in the new mines than in the older ones, where the works extend to a considerable depth below the surface. But this points to the fact that the first cost of the furnaces, condensers and other appurtenances of a large modern distillation plant for quicksilver extraction is greater than can be afforded by mining companies of small capital, and that the cost of extraction by this method on a large scale is so great as to leave no margin of profit to those operating on low-grade ores.

The methods of modern mining, where machinery takes the place of manual labor and thus cheapens the bringing of the ore to the surface, lessens the cost of mining where these are introduced, and in a lesser degree the same may be said of the improved furnaces and other apparatus used in distillation. But to effect such a reduction in cost of extraction of quicksilver as to make this enterprise generally profitable a radical change in the system is necessary.

That such a system is possible will be now shown. Mercury sulphide, also known as cinnabar, as generally found in our mines, and also two or three varieties more rarely found, is soluble in several cheap forms of chemical solutions, and it is on this fact that the new method rests. In this it follows the cyanide method of gold extraction, in that it involves crushing and leaching. The cost of the solvent for quicksilver, however, is very much less than the cost of the cyanide used in gold extraction. The efficiency of the method is also greater, as it is not interfered with by the antagonistic reactions common to the more complex ores in which gold is found.

The operation is briefly as follows: The crushed ore being placed in leaching tanks, and submitted to the action of the chemical solution, after a certain period it is found that all its mercury content has entered into solution. The solution is then drawn off and passed through what is known as the "electrolytic sluice," where the quicksilver is immediately deposited in a pure metallic form and flows into a tank prepared for the purpose, and the solution, exhausted of its metallic contents, is again used as a further solvent.

The cost of the plant for this method is very much less than for the distillation method of extraction. For the working of 100 tons of ore per day there are required six tanks of that capacity, a dynamo of sufficient power for the deposition of the quicksilver contained in the ore operated on, a pump for the solution, and an electrolytic sluice. This, after the crushing machinery common to both systems of extraction, constitutes almost all of the plant necessary. And the cost may be proportioned to a lesser amount of ore to be operated on by providing a plant of lesser capacity and of consequent less expense.

So, a mine having only an output of ten tons of ore per day may start with a cheap plant of small capacity of extraction and work at a profit until a larger output may warrant the erection of a larger plant.

At the works of the New Almaden mine, having all the modern improved methods, and apparatus of distillation, and operating on large quantities of ore, the cost of extraction after crushing amounts to about 75 cents per ton of ore. The loss of quicksilver during the operation amounts to from 7% to 10%. In the new method the cost of extraction would be less than 50 cents per ton of ore when work is done on a large scale and with power handling of the ore, and the cost need not rise as high as that of the New Almaden works, even when operated on as small a scale as ten tons of rock per day.

The most essential part of the new method of extraction, and that which makes possible a cheap and efficient means of working, is the electrolytic sluice. This is an apparatus having a large number of vertical electrodes so arranged that the solution passes between and is almost instantly deprived of its metallic contents. As the quicksilver immediately flows from the cathode plates on which it is deposited and passes into a tank, where it is protected from the solvent with which it may be in contact, the sluice may be kept constantly in use with but the slightest supervision. It is only required, after the solution has passed through the sluice, to run the quicksilver into flasks from a lower level to complete the entire operation.

The electrolytic sluice may be made with a capacity of 600 pounds of quicksilver per day with an expenditure of electric force amounting to about 6 H. P. There is no necessity, under the conditions employed, either of solution or of deposition, of any loss of metal; and this alone recommends the method as a means of extraction, for there is no doubt that, though the losses at New Almaden may sometimes run as high as 10%, the losses in works of less perfect construction run as high as even 25% or 50%. In such places, as is generally known, a slight exposure to the smoke from the furnaces, even in the open air, causes salivation, showing the large amounts of mercury carried away as fumes. It may be stated that it is the electrolytic method of gold extraction so extensively used in South Africa and Australia, and known as the Siemens-Halske process. The electrolytic sluice is constructed for the work to be accomplished, and in all its processes follows closely the well-known laws of electrolysis in producing a deposition strictly in proportion to the power expended; and, therefore, its powers of deposition may be exactly adjusted to the amount of metal in the flow operated on, or, when this is too large, the solution may be diluted to correspond to the highest extractive power of the density of current employed.

The advantages of the described new method of quicksilver extraction, in comparison with the distillation method, may be given as follows:

It involves a lesser cost of construction.

A saving of the large amounts of metal lost in distillation.

A lesser cost necessary in the operation of extraction plant.

The possibility of working lower grades of ore at a profit.

The possibility of applying water power or electric power to all the operations of the process.

And in the elimination of all danger to the health of the workmen and those residing in the neighborhood by the entire absence of mercuric fumes.

## Copper Mineral Formation in Smelters.

Prof. A. N. Winchell, of Butte, Mont., notes, on the formation of certain copper minerals in smelters, as follows: "Chalcopyrite has been reported more than once as an accidental product in metallurgical operations. Bornite, or peacock copper, on the other hand, has never been described as an accidental furnace product, nor as produced by sublimation. Both of these minerals are formed artificially at the smelter of the Butte & Boston Con. M. Co., at Butte. The minerals form slowly, attaining their maximum thickness of about 4 inches in the course of six months or a year, and render necessary the frequent replacement of the old rails by new ones. They form in the caliner along the rails in the bed of the furnace. In fact, they not only form from beneath the flanges of the rails, but also slowly replace the rails themselves. When the rails are removed only a thin upper surface layer of iron remains; all the rest has been changed into chalcopyrite and bornite, with the exception of that portion of the rails completely embedded in the brick bed of the furnace. There is no sharp line or demarcation between the remaining iron of the rail and the new minerals formed. Examination of these minerals shows that the one that is by far the more abundant is unquestionably chalcopyrite; the other is in all probability bornite. An analysis of the former mineral shows an excess of iron; otherwise the mineral has the composition of chalcopyrite. Both minerals have been formed by sublimation and not by fusion, since the temperature of the furnace never rises high enough to fuse the ores present."

## Form for a Report on a Quartz Mine.

Many inquiries are made of this journal for a form of report for quartz mining propositions. The inquiries do not refer to a form for an expert's opinion, but rather one which would enable the owner of such a proposition to prepare, without an expert's assistance, a statement of the essential facts relating to his property, in a concise, comprehensive form, as a basis for preliminary consideration by a capitalist and his expert advisers.

The following, it is believed, will be of assistance to the owners of such propositions. It could be printed in blank form, with spaces left for the statements and answers to questions. This is not essential, however. The claim owner can follow the sequence of the following and write out the information directly—that is, the answers to the questions can be written out in the order and grouping suggested without writing out the questions also.

The statement as written would begin with the introductory heading, "Report on Quartz Mining Locations:"

Named.....; Patented or unpatented?.....; In the..... Mining District, County of....., State or Territory of.....; Located by.....; Recorded in the office of the....., in town of....., on....., 18.., and recorded in book....., on page.....; Up to what date has assessment work been done?.....; How much more work is necessary before patent or grant can be had?.....

Size of properties is.....

Development work done on surface to show up vein consists of.....; Underground development consists of.....; Are all tunnels, shafts and underground workings in good order?.....; Wet or dry?.....; Are all the tunnels, shafts and underground workings in a condition suitable for inspection now?.....; If not, specify what is wrong.....; Give remedy.....; What time will it take to remedy?.....; What will it cost to put into suitable condition for thorough inspection?.....; Will owners place underground workings in condition suitable for inspection?.....; Between what dates can properties be properly inspected?.....

Machinery, improvements, buildings, etc., are.....; Description of main vein is.....; Dip of vein is..... degrees to the.....; Width on surface.....; Length proven on surface.....; Width of vein in lowest workings.....; Intermediate width at..... feet depth.....; Width of pay streak, if any.....; Walls—Foot wall free or frozen.....; Hanging wall free or frozen.....; Country rock, foot wall.....; Country rock, hanging wall.....; Do walls carry any value?.....; Ore soft or hard?.....; Composition of ore?.....; Value of ore per ton—Gold, \$.....; Silver, \$.....; Copper, per cent.....; Lead, per cent.....; Zinc, per cent.....; Is ore free milling?.....; What per cent is free milling?.....; Probable treatment required.....; Can concentrates be cyanided or otherwise treated at the mine?.....; By what process.....; Have there been any assays made from samples fairly taken across the vein from wall to wall?.....; If so, what values are shown?.....; If a concentrating proposition, what proportion does it concentrate to?.....; What is the value of a ton of such concentrates?.....; Average assay of pay streak, \$.....; Average assay of workable ore, \$.....; Individual assays show \$.....; What per cent of the ore value can be realized in bullion form?..... per cent; Have there been any mill tests?.....; Amount of ore milled,..... tons; What value per ton of ore do mill tests show? \$..... per ton; What amount of ore has been stoped out?..... tons; Value of ore in sight in present workings, \$.....; Amount of ore in sight in present workings?..... tons; Describe other veins carrying values.....; Topography of claims.....; Are the veins in the district, as a rule, uniformly mineralized, or do values lie mostly in shoots?.....; Are the veins described in this report uniformly mineralized, or does the pay ore exist in shoots?.....; Altitude.....; Tunnel or shaft proposition.....; Can tunnel be run in on vein matter?.....; If not, how many feet of crosscut necessary to get vein?.....; What depth will be gained per foot of tunnel?.....; Is there a mill site?.....; How far from mouth of mine?.....; Is water available for power?.....; How far is it from mill site?.....; What volume of water is available?.....; What head of water is available?.....; What horse power will it develop? Can additional water power be had within ten miles?.....; How many horse power?.....; Is timber suitable for mining purposes plentiful?.....; Cost of fuel at mine?.....; Is there a wagon road to mine?.....; If not, what would it cost to build one?.....; Nearest railroad station.....; Location of nearest smelter.....; Location of nearest custom mill, if any.....; Second hand machinery unused and for sale.....; Its condition.....; Time for inspection and sampling of properties.....; How much time can be had for working operations and for negotiating sale of properties?.....; Price, \$.....; Terms of payment.....; Property ever reported on?.....; By whom?.....; Where can we get copy of report; Are any adjoining properties for sale?.....; Give names.....; Names and addresses of owners.....; Draw map of properties and adjoining locations, if any.....; Give sketch of underground workings.....

It is a good idea to take a full line or more as needed for the answer to each separate inquiry. It facilitates reference and comprehensive consideration. If several claims are included, the name of each should be stated, and if the character of ore differ it is desirable to write a separate report for each. The maps and sketches are quite important. They should be made clear and complete, so as to assist the reader. It is business that pays to do this well. No information that is in any way pertinent should be reserved.



## Small Things in Mining.

Written for the MINING AND SCIENTIFIC PRESS by  
W. H. STORMS, E. M.

The economies of mining are made up of small things, which, comparatively insignificant in themselves, make up the great science and business of mining, whether the operation be great or small. Every careful manager is desirous of getting as great a return for the money expended as possible, either for supplies or labor. In labor particularly it is necessary to economize. In order to accomplish this, small details of labor must receive attention, and wherever possible mechanical devices should be introduced, which will not only lighten the labor of the men but will facilitate the work in hand, and consequently hasten and cheapen it by reducing the time required to perform any particular duty. In the shafts at the Baliol mine at Jackson, Cal., we have recently introduced devices which were calculated to expedite matters in shaft sinking, and it has been found that these devices act admirably.

Sinking is accomplished here with two machine drills, each on a separate bar placed near the ends of the shaft, which is in two compartments, the cutting being about 7x11 feet. The sinking crew consists of nine men, three on each of three shifts. This crew drills all the holes, blasts, mucks out, and also does the timbering, under direction of the foreman. Often the "cutting holes" are 7 or 8 feet deep, and few of the holes are less than 5 feet deep. In drilling such deep "down holes" it becomes necessary to frequently remove the sludge formed in drilling. To expeditiously remove the sludge is a problem. To accomplish this, usually a scraper or a "muck" stick is employed, until the hole is drilled deep enough, when the machine is shifted to a new position and another hole drilled, continuing until all the holes of the round have been completed, when the machines are taken down and all the holes are blown out by means of a pipe attached to the compressed air hose. This latter is the most satisfactory way of cleaning deep holes, leaving them, as the miners say, "as clean as a whistle," but it is found that the time required to remove the muck from the holes while drilling is so great, when the muck stick or iron scraper is employed, that we introduce a sort of "sand pump" which works expeditiously and with perfect satisfaction. This device consists of a piece 1-inch steam pipe in three lengths, 6, 8 and 10 feet, for the varying depth of hole. In one end is inserted a piece of  $\frac{3}{4}$ -inch pipe, 6 inches long. To secure this short piece of pipe in place, the end of the inch pipe is heated and the  $\frac{3}{4}$ -inch pipe driven in until its lower end has passed about 2 inches beyond the end of the inch pipe, when the outer pipe is shrunken on. This having been accomplished a marble, such as school boys use in play, is dropped into the upper end of the larger pipe, whence it falls and rests upon the ring formed by the smaller pipe that has been driven into the larger. Of course a marble must be chosen which will not pass through the smaller pipe. A steel pin is then driven through the larger pipe, holes having been previously bored for the purpose, about 2 inches above the top of the small pipe. The marble must have free play, being only a little over three-fourths of an inch in diameter, and is confined between the steel pin and the top of the  $\frac{3}{4}$ -inch pipe. When



FIG. 1.

as large as can be operated satisfactorily in the ordinary machine drill hole.

Another simple device employed in sinking in the Baliol shaft is the false track at the bottom of the shaft. I have seen a great many different kinds of false track, but this, I think, is superior to any other I have seen. It is an idea of J. D. Brown, fore-

man at the Baliol. This device consists of a pair of 20-foot "T" rails for each track. Our regular track consists of 30-pound steel rails, but we have found it expedient to lay temporarily 16-pound rails while sinking, these being spiked down in the usual manner for about 100 feet, the change to the heavy rails being made at some time when it will not seriously interfere with the work in the shaft—at the time of cutting a station or at any other convenient time. The 16-pound rails are about 20 feet in length usually, and are put in place to within a set or two of the bottom, a 10-foot section employed when necessary. To enable the skips to reach the bottom of the sink, however, the "sinking rails" or false track are put in place. These, as above explained, are 20 feet in length and are placed in a reversed position, that is, the ball of the rail is placed downward, the base overlapping the main rail and upon the outer side of it. The base of the rail being wider than the ball, keeps the gauge about right. The upper end of the base is forged down flat, and spread somewhat, so that it will not form too great an obstruction on the track, the skip passing smoothly or with little jar over the end of the rail. The web at this upper end is also "upset" somewhat, the ball and the base being drawn closer together in order to make the rail fit more snugly. The false rail may be placed in position when the bottom of the sink is but 2 feet below the end of the main rails on the last set of timbers (though ordinarily the timbers do not approach so closely to the bottom), and the work may be extended downward until it is 10 or 12 feet below the last set. If it is desired to go further, a rod with clamps at the end must be provided to prevent spreading of the rails. The "false rails" are securely clamped to the main rails by means of a device, the construction of which is shown in the accompanying sketch, Fig. 2. The clamps are made

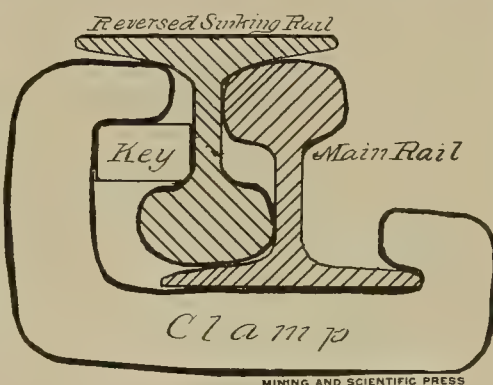


FIG. 2.

secure by driving in a key or wedge, as shown. At first we tried a bolt provided with nuts, etc., but this required too much time for adjustment and was abandoned for the key, which answers the purpose admirably. We always have an extra set on hand in case of a part or all of a clamp being misplaced or lost. The rails are always removed before blasting and drawn upward several feet and securely clamped, so that when required they may be quickly replaced. The rails are lowered as sinking progresses.

When a round of holes has been completed the machines and all the paraphernalia employed in drilling are sent to the surface, when the machinist carefully examines each machine, making such repairs as may be required. It has been found that this plan is more expeditious than that of removing machines, tools, blocks and bars to a level above.

The timbers are protected by fenders of a tough pine 8x10 inches, which are bolted firmly to the main members of the set. The latter are of 10x10 Oregon pine. Two holes are bored near each end of the fenders, these corresponding to the holes bored in the main foot and hanging-wall plates for the passage of hanging bolts. As but one of these holes at either end in the bottom set is in use at a time for hanging the plates, the other is used for securing the fenders. For this purpose bolts are employed having a length equal to the thickness of the plate and the fender, with room for washer below and washer and nut above, making a total length of 20 $\frac{1}{2}$  inches, beside the solid head of the bolt. These bolts are inserted from below. Similar fenders are secured to the end plates in like manner, special holes being bored for the purpose in both end plates and end fender. The wall-plate fenders also have cup-shaped holes cut on their upper faces to accommodate the lower ends of the hanging bolts, with their washers and nuts, which are exposed below the lowest timbers of the main set. If this provision be not made the fender cannot be snugly fitted to the plates. In the Baliol shaft the hanging-wall plate only is protected in the manner described, it having been found that the foot-wall plate suffered little or no damage from blasting. The fender is provided with four transverse bolts and large washers distributed at equal distances, which are for the purpose of lessening the likelihood of splitting the fender by blasting. The set of fenders now in use have protected six sets of timbers and appear to be good for possibly as many more, before being too badly battered to be of further service. The

timber sets are also reinforced by tightly spragging between the last and next to last hanging-wall plates, opposite the center of each compartment. Similar sprags are placed at the ends of the shaft. All this may seem to some an unnecessary expense of time and material, but where ground is fairly hard and slab-like, necessitating carrying the timber sets close to the bottom of the shaft, it pays well to take these precautions, as we have learned by practical experience. As we fire the center cuts first and the ends later, we have had little or no trouble with broken timbers since taking these precautions. It is extremely doubtful, however, if this plan would be of much service where a full round is fired by electric battery.

Another small matter, but one worth mentioning, is the fact that after no end of trouble with machine-drill chuck bolts, we have found that bolts made from cold-rolled shafting endure longer than those made from any other material we have thus far tried. Sutter Creek, Amador Co., Cal., Dec. 15.

## Asbestos.

By JOSEPH HYDE PRATT.

Two distinct minerals are mined and put on the market as asbestos. They are very similar in their physical properties, but are distinct chemically. One is a silicate of calcium and magnesium and is a variety of the mineral amphibole. There are a number of the nonaluminous varieties of amphibole which pass into fibrous varieties, especially the tremolite and actinolite, and all these fibrous varieties are included under the name of asbestos. The other mineral that is called asbestos is a variety of serpentine, a hydrous magnesium silicate known as chrysotile. It was the former of these minerals that was originally used commercially, but as the chrysotile began to be used for the same purpose it was placed on the market under the same name. While these minerals are equal in their heat-resisting properties, the chrysotile is superior in strength and elasticity of fiber to any variety of amphibole asbestos. The former mineral is usually greenish-white, green, yellowish to brownish in color, and has a decidedly silky luster. The fibers are flexible, easily separating from each other and have a silky appearance. It is usually found in seams of varying width in serpentine rocks. The amphibole asbestos has been found in longer fibers than the former, and these are flexible and easily separated by the fingers. They do not have the silky luster of the chrysotile, but have more the appearance of flax. The color varies from white to greenish and woody-brown. One of the main chemical differences between the two is that the amphibole asbestos is an anhydrous mineral, while the serpentine or chrysotile variety is hydrous, containing from 12% to 14% of water. They can be readily distinguished by making a test for water.

The amphibole variety of asbestos is quite widely distributed, but there are not many localities known at present where it occurs in quantity, and then again, on account of the superior qualities of the chrysotile asbestos, there is not as large a demand for the other variety and thus there is but little stimulus given to prospecting for it.

The only two States in which mining has been carried on for asbestos during the past two years are California and Georgia. The latter has produced practically all of the asbestos mined in the United States during the past year. The asbestos deposits of Georgia are located at Sall Mountain, White county.

It is quite common to find the chrysotile asbestos or fibrous variety for serpentine in small amounts associated with the serpentine rocks in various localities throughout the United States. Until recently, however, there were no deposits found where the chrysotile occurred in commercial quantity. At Caspar, Wyo., deposits of this variety of commercial asbestos have lately been found and are being developed.—American Manufacturer.

## Platinum in Norway.

TO THE EDITOR:—I have found here in Norway a ledge of peridotite with serpentine, containing platinum, palladium, tridium and some gold. The ledge is from 4 to 11 feet wide, with quartzite on one side and gabbro on the other side, as well as outside the quartzite. The ledge is running northeast and southwest, almost vertical. We have had a number of assays made, all showing the above mentioned metals from very little, six to twelve grains, up to seven and eight ounces per ton. We also have found several pounds of terrestrial iron in scales. We send you by same mail a small piece of the lode and a few scales of the iron. H. CH. TYSEE.

Arendal, Norway, Nov. 30, 1901.

It has been stated that the total costs per pound of producing copper in 1900 from mines in the Lake Superior region were as follows:

|                      | Cents Per Pound. |
|----------------------|------------------|
| Calumet & Hecla..... | 10.54            |
| Tamarack.....        | 10.94            |
| Quincy.....          | 13.63            |
| Osceola.....         | 12.41            |
| Atlantic.....        | 14.75            |



## Some Principles Controlling the Deposition of Ores.\*

NUMBER II.—CONCLUDED.

By C. R. VAN HISE

Passing from the specific points concerning the circulation of underground water, I, of course, largely dissent from Prof. Kemp's general view upon this subject, and can only refer to the argument already given in my paper. If the evidence there presented, showing that the main source of the underground water depositing the ores is meteoric, and not derived from the igneous rocks, as held by Prof. Kemp, does not prove the point, it is useless further to discuss the matter here. In my treatise on Metamorphism I shall cover this part of the subject much more exhaustively. While I hold that the main source of the water depositing ores is meteoric, I recognize that another source of such water is the igneous rocks.

While I have never advocated a universal uniform underground circulation, as implied by Prof. Kemp, I have held, and still hold, that the amount of underground water and its circulation is much more general than he believes. This problem may be considered, first, from the point of view of the amount of underground water now present; and second, and more important, the amount of work which has been done by underground water.

Upon the first point, it is contended by Prof. Kemp that the amount of underground water in the belt of saturation is usually small; but in opposition to this view we have the general experience of mining men and of those who by wells seek underground water. While there are notable exceptions, it is in general a difficult and expensive process to lower artificially the level of groundwater which is generally found in both humid and arid regions, though at greater depth in the latter. In the lead and zinc districts of Missouri, this operation, called by the miners "beating the water," is usually attempted only by a number of companies, acting jointly, and constitutes the most formidable part of mining work.

In Wisconsin, it is a grave hindrance to mining below water level. The lowering of the groundwater by, say, 50 feet, is an exceedingly difficult task, involving enormous expense in pumping. The subsequent holding of the water at a given level is much easier, as Prof. Kemp has noted. But my conclusions from these facts are that, in the belt of saturation, the openings are large and the quantity of water is great, but the circulation is, in most cases, not too rapid to be controlled by pumps of moderate capacity—although, in some cases, to hold the water at a given level involves the handling of vast quantities of underground water.

In this connection Prof. Kemp remarks that the circulation at smaller depths than 1500 or 2000 feet has no bearing on the question of ore deposition. While a few ore deposits have been profitably worked to a greater depth than this, it is well known that probably not more than 90% of the metallic wealth of the earth yet mined has come from above the 2000-foot level; and therefore there is no warrant for the statement that the circulation above this level is not of vital importance in the production of ore deposits.

In this matter of depth, Prof. Kemp asserts of the general circulation of underground water, that "something like 2000 feet appears to be its limit;" but the only evidence which he presents upon this point is that in some cases this is the fact. The local instances cited are not proof of such a law. On the other hand, the evidence which I have presented to the contrary is reinforced by the arguments of Prof. Vogt, which, combining the facts of observed depth of denudation of veins with the likeness of their deeper parts to those parts nearer the surface plainly produced by underground waters, clearly lead to the conclusion that, in many cases, the underground circulation must have been efficient to a depth several times greater than 2000 feet.

On the second point, the work of underground water, Prof. Kemp declares that veins are the exceptional, not the general, work of this agency. He says that while veins occur locally in mining districts, there is a "general absence of veins." If Prof. Kemp means mineral veins, this is of course true; but if he means literally what he says (and it is only with this meaning that any argument can be made as to the circulation of underground water), I wholly dissent from the conclusion. In my field work throughout the United States and considerable areas of Canada I have yet to find a district in which a series of rocks has been in the belt of saturation for a long time geologically in which there are not extensive metasomatic changes in the rocks, and many veins.

While I have never advocated a universal, uniform, vigorous underground circulation, as implied by Prof. Kemp, I have held and still hold that, almost universally, in those places where ore deposits occur, a vigorous circulation was going on during the time the ores were deposited; and at the only places of which I know where ore deposits are now forming, such a circulation is going on. The fact that some areas in which ore deposits are now worked do not

now show a vigorous circulation has no bearing upon the question of the deposition of these ores by underground water. The very process of vigorous circulation by underground water results in the cementation of the openings, as I have fully explained. In so far as the innumerable openings are filled, and during the process here and there ore deposits are formed, just to that extent the openings are closed. When the openings have been filled to such an extent that they become subcapillary, circulation practically ceases for the time. But subsequent earth-movements or igneous intrusions may again produce openings in the rocks, and thus a new circulation may be set up. Of course it is well known that in the deep copper deposits of the Lake Superior region, and at various other localities, as at Przibram, there is not now a vigorous underground circulation. I cannot believe that Prof. Kemp therefore dissents from the conclusions of Pumpelly, Irving and others, that in the Lake Superior region the deposits of copper in the openings of the conglomerates and amygdaloids, extending to a depth of 5000 feet, or more, are the cementation result of circulating underground waters. Posepny realized full well that when the ore deposits were formed at Przibram, there was a vigorous circulation of underground waters at a depth below 1100 meters. With regard to the formation of the deep deposits of Lake Superior, Przibram, and many other localities in all parts of the world, cited by Posepny, in some of which there is now but a feeble circulation, I am but a follower of Sandberger and Posepny and nearly all the eminent geologists who have written upon ore deposits, in the belief that these ores were put in place by underground waters. In whatever respects I may differ from Sandberger or Posepny, there is absolute identity in our fundamental contention that the great majority of the metallic ores, to the greatest depth penetrated by man, were deposited in the places where they now exist by circulating underground waters.

The localization of ore deposits, of which Prof. Kemp speaks, I have shown to be due to the fact that each case of the formation of a deposit "requires the fortunate combination of many favorable factors working harmoniously together, the absence of any one of which may prevent the concentration of the ore deposit." Only here and there have existed the remarkable combination of circumstances necessary to form an ore deposit, and thus once in a million times, or once in ten million times, a vein formed carries a sufficient amount of the valuable metals to be an ore.

Therefore, notwithstanding the contrary belief of Prof. Kemp, I again assert that the deposition of the great majority of ore deposits—namely, those produced by underground water—is a special case of the general work of underground water, which can only be adequately explained by a profound knowledge of the facts and principles controlling the circulation and work of underground water, and a detailed knowledge of the special modifications necessary to explain the localization and relation of the ores.

### A Mine Tunnel Door Device.

TO THE EDITOR:—Your editorial of November 30, regarding the recent fire in the Smuggler mine, with its loss of twenty-four lives, and urging that means be employed to prevent similar accidents in other mines, suggests a simple and inexpensive device by which a draft into the tunnel can be automatically closed in case of fire at the portal. In tunnel work it often happens that the buildings at the mouth or portal are deserted, while all hands are inside at work; it is at such times that fires are most likely to occur, either from the forge or from a match carelessly dropped among the chips made in framing timbers; hence it is exceedingly desirable that the method employed to prevent smoke and gases from entering the tunnel be automatic.

Let a strong door be placed in the tunnel, not less than 50 feet from the mouth, closely fitted to the tunnel timbers, so as to shut off all draft when closed. To the inside face of the door attach a strong cord, running through a pulley, with a weight at the end sufficient to close the door and hold it tightly in place. To the outside face of the door also attach a cord or small hemp rope, running it through a small pulley so placed as to allow pulling the door wide open by means of the cord. Open the door and carry the line of rope out through the tunnel, around the sides of the blacksmith shop or other buildings, and back into the tunnel, passing the rope loosely through rings or pulleys placed a few feet apart to hold the rope in place. The end of the rope taken back into the tunnel can be fastened to the timbers, but pulled taut so as to hold the door open. In the event of a fire occurring at the mouth of the tunnel, the small hemp cord is sure to be burned very quickly at some point if it has been carried entirely around the inside walls of the buildings; and no matter where burned it releases the door, which is instantly closed by the weight, effectually closing all draft into the tunnel. The loop of the cord may be indefinitely extended through various rooms or parts of rooms provided it be without knots and suspended so as to run loosely through the rings when parted.

F. N. FLETCHER.

## The Gasoline Power Engine.

By E. W. ROBERTS, M. E.

I note in the November issue of *The Automobile* a request for a rule for calculating the power of gas engines. A very simple rule for the purpose, and one which the writer has tested many times, is expressed in the following equation:

$$H = \frac{D^2 \times L \times R}{18,000} \text{ for a four-cycle engine;}$$

Wherein D=the diameter of the cylinder in inches;  
L=the length of the stroke in inches;  
R=the revolutions per minute of the crankshaft;  
H=the delivered or brake horse power of the engine;

For a two-cycle engine the formula becomes:

$$H = \frac{D^2 \times L \times R}{13,500}$$

Stated in words the rule is as follows:

Multiply together the square of the cylinder diameter, the length of the stroke and the speed in revolutions per minute; and divide this product by 18,000 to obtain the horse power of a four-cycle engine, and by 13,500 to obtain the horse power of a two-cycle engine.

The equation has the same numerator for gas engines of all kinds, and working on any sort of fuel. The denominator will vary according to the conditions under which the engine is working and with the fuel. The denominators are, however, those which fit the average engine of its respective class working with gasoline as a fuel.

These formulas will give the horse power within 15% for engines ranging from 4 to 50 H. P. and working with the usual mean effective pressures of from sixty to seventy pounds per square inch. The writer was talking to a builder of gasoline automobile engines last summer and he was informed that his standard engine would give any result between 5 and 6 brake H. P. when tested, although the engines were, so far as could be seen, identical in every respect, proving that a rule to give exact results must be flexible indeed.

It is always a good plan to select an engine with an ample margin of power. A gasoline engine is peculiar in that it cannot be overloaded like a steam engine. If by any chance an excessive load is put upon it, the engine slows down and very soon stops. This is because there is no means of increasing the mean effective pressure in a gas engine cylinder after it has reached the point where it is working with a full charge.

One of the most deceptive things to the non-technical man is the manner in which the manufacturer uses the term horse power. Quite a few builders are listing their engines as giving so much indicated horse power. This is often taken to mean that the engine has that amount of effective horse power available for driving the vehicle. A gasoline engine may give 5 indicated H. P. and yet but 3 H. P. out of the five would be available for driving the automobile to which it was applied. While this ratio is an extreme and indicates a mechanical ratio of only 60%, such a low efficiency as this is occasionally found in small gasoline engines. This shows that the purchaser of a gasoline engine would do well to insist upon a guarantee of a certain brake horse power at a specified speed of the engine. He should not be even satisfied with a guarantee that the engine will give the specified horse power. An engine that will give 5 H. P. at 500 revolutions per minute will give very nearly if not quite 10 H. P. at 1000 revolutions per minute.

A point which is quite often lost sight of by the gas engine designer, and one which the purchaser would do well to remember, is that obstructed inlet or exhaust passages cause a falling off in power. The loss of power is more apparent with an obstructed inlet passage than with an obstructed exhaust passage when considering the ratio of power lost to the amount of the obstruction. These passages should be designed not only in proportion to the diameter of the cylinder, but to the speed of the engine as well. There is no particular objection to an oversized passage, and it is therefore the best plan to design these passages with reference to the maximum speed at which the engine is to run for any considerable length of time.

The rule that is generally observed by the most experienced designers is to limit the speed of the gases in the inlet passages to 100 feet per second and in the exhaust passages to 85 feet per second. It is assumed for convenience that the speed in the exhaust passages is produced by the action of the piston with the gas at atmospheric pressure. Virtually, however, the pressure at the moment of exhaust is from thirty to thirty-five pounds per square inch, and it is for this reason that the lower limit is taken for the speed of the exhaust gases.

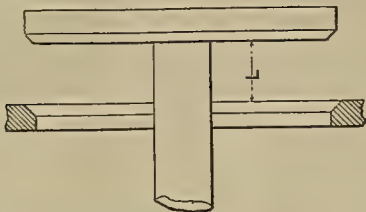
As an example, to illustrate the application of the above rule, say, take the case of an engine with a 6-inch stroke running at a speed of 600 revolutions per minute. In a complete revolution the piston travels 1 foot, and it is therefore running at a speed of 600 feet per minute, or 10 feet per second. Therefore, in order that the speed of the gases in the inlet passages should not exceed 100 feet per second, the

\*Abstract of paper read before the American Institute of Mining Engineers, Mexican Meeting.



area of the passage should not be smaller than one-tenth that of the piston. Should the speed of the engine be increased to 1200 revolutions per minute the piston speed would be 20 feet per second and the area of the inlet should be not less than one-fifth that of the piston.

These ratios should be retained even in the valve itself whenever it is practicable to do so, and in valves operated by the suction of the piston they should be even larger. The lift of the valves, as indicated by the distance *L* in the cut should be at



least one-quarter the diameter of the valve in order that the opening may be equal to the full area of the valve.

It is unfortunate but too true that the points considered in this discussion are often overlooked by the average designer. They are brought out in time by hard experience, and the writer wishes to impress their importance upon the mind of the buyer, in order that he may judge intelligently upon these important features in construction and in rating.

#### Tests of California Fuel Oils.

By HOWARD STILLMAN.

The Southern Pacific R. R. Co. has used fuel oil in locomotive service for several years, and is extending its use in proportion to the supply of this class of fuel.

As compared with coal, the following results have been obtained in evaporative tests made with both fuels in locomotive service. The engines with which the tests were made were of the same size and make and in similar service:

| Service, Passenger.                                      | —Fuel—                                     |             |
|----------------------------------------------------------|--------------------------------------------|-------------|
|                                                          | Summerland & Los Angeles Petroleum. (bit.) | Comax Coal. |
| Miles run                                                | 224                                        | 224         |
| Mean number of cars in train                             | 3.71                                       | 3.71        |
| Weight of cars in train, tons                            | 113.01                                     | 110.40      |
| Actual running time, hours                               | 7.55                                       | 7.63        |
| Average steam pressure gauge, lbs.                       | 133                                        | 130         |
| Temperature of feed water, deg. F.                       | 660                                        | 660         |
| Pounds water evaporated                                  | 55,025                                     | 49,833      |
| Gallons oil burned                                       | 775                                        | 8,043       |
| Pounds fuel burned                                       | 6,040                                      | 8,043       |
| Water evaporated per lb. fuel                            | 9.11                                       | 6.19        |
| Evaporation from and at 212° F.                          | 10.96                                      | 7.41        |
| Pounds fuel to evaporate 1 lb. water from and at 212° F. | .09124                                     | .1349       |
| Equivalent of fuel for equal evap., lb.                  | 1.00                                       | 1.48        |
| Ditto, by measure                                        | *168.9                                     | †1          |
| Gallons water evap. per gallon oil                       | 8.75                                       | ...         |
| Miles run per ton                                        | 74.14                                      | 55.72       |
| Fuel burned per hour                                     | *100                                       | †537        |
| Total ton mileage                                        | 25,314                                     | 24,730      |
| Ton miles per gallon oil                                 | 33.53                                      | ...         |
| Ton miles per lb. fuel                                   | 4.191                                      | 3,074       |
| *Gallons. †Ton.                                          |                                            |             |

The above items are from record of fuel tests made with careful attention to weights and measures.

Proximate analyses of the Comax coal are as follows:

|                      | Per Cent. |
|----------------------|-----------|
| Moisture             | 1.90      |
| Volatile combustible | 27.08     |
| Fixed carbon         | 55.38     |
| Ash                  | 12.50     |
| Sulphur              | 3.14      |

Total.....100.00

The fuel oil used in the test was a California product from the locality named, and ranging in gravity close to 16° Baume, its flash point being about 240° F., fire point at 290° F. In practice it is taken at the weight of eight pounds per gallon.

The California oil varies somewhat in gravity, but the fuel oils obtained from the Kern, Los Angeles, Summerland, McKittrick and other fields are represented in the results above shown. They are all dark brown or black heavy asphalt oils, being more or less oxidized petroleum, very thick and viscid at temperatures below 60°, and can only be handled by use of steam-heating coils in the tank or around the pipes.

The grades of California petroleum are many, and should not all be confounded with the fuel oil referred to. There is a wide range in quality for refining purposes, but by the term fuel oil we mean that it is supposed to be of use for little else than fuel, and this article deals more particularly with such oils.

As to the relative cost of either coal or oil fuel, the relative values are based on the figures from the above test for equal calorific effect from and at 212° F.; that is to say, 168.9 gallons of oil equal one ton of coal, to which ratio local prices may be applied. As to the effect on flues, fire boxes, etc., there is rather more trouble with oil from leaky

flues, seams, etc., than with coal fuel. This is due, not to the fuel, but to more rapid temperature changes in the firebox during service, with its subsequent expansions and contractions.

This applies particularly to the use of oil fuel in locomotives, because the service is so irregular in shutting off steam, stopping, starting, etc.

We have used oil fuel in stationary service many years, and it was used as fuel for a long time on the ferry steamers on San Francisco Bay, with excellent results, but was abandoned on account of possibility from accident on crowded boats and the timidity of the public. I had occasion, as a part of my duty, to make occasional inspection of the oil-burning boilers of the steamers Solano, Oakland and Piedmont. I have never seen an instance of damage to firebox plates from use of oil fuel. Stationary boilers, being regularly fired, and not forced in evaporation as locomotive boilers are, do not suffer from the rapid expansions and contractions referred to.

#### Motor-Driven Machine Tools.

The accompanying illustrations represent Bullock motor applications to machine tools. They show the adaptability of electric driving for different classes of machine work. Fig. 1 is of a grindstone, the ma-

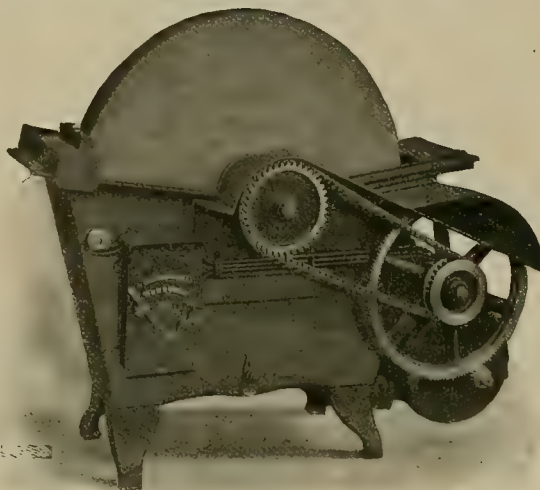


FIG. 1.

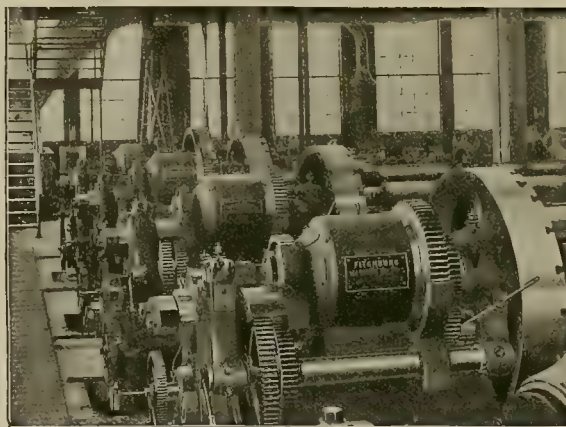


FIG. 2.

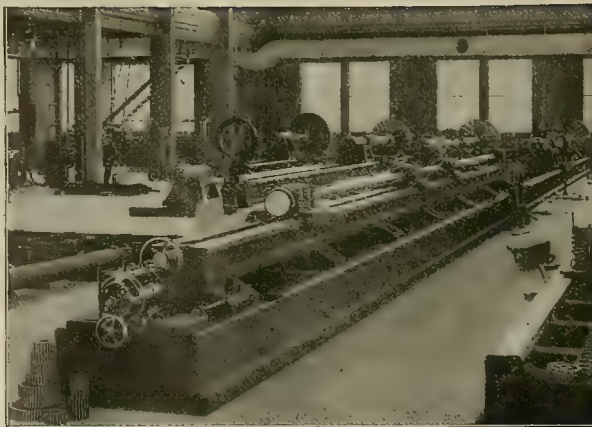


FIG. 3.

chine being made by the Brown & Sharpe Manufacturing Co., and now in operation at the League Island Navy Yard, near Philadelphia. Figs. 2 and 3 show large sized lathes in the works of the Fore River Engine Co. at Quincy, Mass. These lathes

were made by the Fitchburg Machine Co., and one of them is 110 feet long over all. Bullock motors are mounted on the head and tail stocks, the speed control being obtained by the Bullock multiple-voltage system, giving six speeds in either direction without the use of resistance in the field or armature circuits. The Fore River Engine Co. operates 120 motors of the Bullock Electric Manufacturing Co.'s make.

#### Notes on a Mining Trip in Idaho.

Written for the MINING AND SCIENTIFIC PRESS.

The writer spent the months of August and September traveling through southern and central Idaho, looking over the developed mineral resources of those sections of the State. Custer county, which is about the geographical center of Idaho, was visited by way of Ketchum, the nearest present railroad point. This place is the terminal of a branch road which leaves the main Oregon Short Line at Shoshone and runs north up Wood river about 80 miles. Ketchum is an old smelter town, considerable quantities of lead-silver ores having been smelted here in the '80's. An English company owns the smelters and are doing a little prospecting work.

At Ketchum I took a guide and a team and traveled northward up Wood river, crossing the Sawtooth range, the divide between the Salmon and Snake rivers at about 9000 feet elevation. Near the divide I passed through the deserted mining camp of Galena. This camp was built up on rich bunches of lead carbonates and silver ores. Between the Sawtooth range and Salmon river lies Stanley Basin, a sheep grazing and cattle range country. I saw numbers of hot sulphur springs here. Eighty miles north of Ketchum, and about a mile apart, lies the half abandoned towns of Bonanza and Chester. Chester once supported several thousand people; now it contains only a few hundred. Bonanza is even smaller. Bonanza lies at the foot of Mt. Peters, the main peak of the district.

Lying on the south side of Mt. Peters, 6 miles by trail and -16 by road from Bonanza, are six silver claims. These were opened in 1877 by an incline shaft about 500 feet deep and several tunnels, and \$330,000 value of ores were shipped to the Omaha smelters from here. The ore was rich in silver—about \$2 in silver to \$1 in gold. The vein strikes north and south and dips 55° to the east.

Careful sampling shows that the main ore shoot is but 30 feet long—a mere chimney. The surface of the claim is covered with boulders of blocky diabase, which completely hides all croppings and makes surface prospecting difficult. The main vein is in a contact between felsite porphyry and diabase. There are indications of the existence of other parallel veins on this mountain top. Indeed, some of my samples of the surface were very encouraging.

North of and adjoining this group, lie a group of claims now being developed by a Boston company. This company have spent considerable money developing their property and are building roads, a saw mill, bunk house, office and a 10-stamp mill. It is said they have a vein 3 feet to 6 feet wide, with three shoots from 30 feet to 50 feet long. The ore averages \$27. The reported price paid for these claims was \$100,000—\$5000 down.

The Chas. Dickens claim, lying between the towns, is interesting for the fact that it produced \$500,000 in gold from a surface pocket. It was then sold to an English company, who, after spending considerable, failed to find the continuation of the ore shoot. All workings are now closed.

Above the town of Custer, on Mt. Custer, is situated the famous General Custer mine. Between '80 and '87 the mine produced \$5,000,000 to \$6,000,000. The ore body of the mine was exposed by either a land or glacial slide, which carried away the hanging wall of the vein. The ore thus laid bare was simply quarried out and shipped by wire rope tram to the mill. No work has been done here since '91.

The Lucky Boy group, adjoining the Custer mine, is being worked now. This has produced about \$3,000,000. It is opened by an incline shaft 630 feet deep, with eight levels. The vein varies from 18 inches to 15 feet wide, averaging 6 feet to 7 feet. Three ore shoots exist 120 feet to 250 feet long, and are continuous from top to bottom. A normal fault with a 15-foot throw occurs between two of the shoots. The quartz is of the hard, white, glassy variety, showing occasionally ribboned struc-



First, passing through solution from a series of zinc anodes to a corresponding series of metallic cathodes, a current of electricity, next introducing into solution alkaline hydrate, next introducing into solution, so treated, a soluble alkali-metal sulphide, and finally separating from solution resulting zinc sulphide precipitate.



## MINING SUMMARY.

Specially compiled and reported for the  
MINING AND SCIENTIFIC PRESS.

### ARIZONA.

(Special Correspondence).—The proposed new railroad line, being projected from Phoenix to Benson, will go via Tempe, Mesa, crossing the Gila river not far from Florence, passing near the rich mineralized section around Copper Buttes, Ray and Kelvin, thence up the San Pedro via Mammoth to Benson, connecting at the latter place with the Arizona & South-eastern, which will soon be operating its through line from Benson to El Paso, via Bisbee, Douglas and Deming, with a branch from Douglas to the copper mines at Nacosaria, Mexico. The Phoenix-Benson line, now being surveyed, is supposed to be a Santa Fe project. It will open up a section of known mineral north and give a direct route to the El Paso smelters over a competing line. The Clifton-Lordsburg line will also connect with the Benson-El Paso line.  
Phoenix, Dec. 23.

### GILA COUNTY.

C. H. Cutting, manager of the Troy C. Co. and Supt. of the Manhattan C. Co. at Troy, states that work is being continued by about 100 men on both properties, with ore bodies opened in the Copper Queen mine of the Manhattan and on the Alice of the Troy. The Troy Co. has ordered two 40 H. P. boilers, a steam hoist to replace the gasoline hoist (which will be transferred to the Sisson shaft on the Manhattan), a compressor and machine drills, together with a pumping plant. The erection of a smelter will be considered early in the coming year. Surface improvements in the shape of roads, ultimately to become tramroads, connecting the Manhattan and Troy properties with the proposed smelter site, are being made.

### GRAHAM COUNTY.

The Shannon Copper Co.'s statement for the year ending October 31 shows that during the year the company paid \$1,003,850 for mines and \$240,074 85 for mine development and smelter construction. During the year 5129 lineal feet of development work was done. The mine is opened to a depth of 1100 feet by tunnels. At the present time the company propose to work the ores above the Boulder-Shannon level, which is 360 feet below the apex of the mountain. From the mouth of the tunnel the ore will be trammed 600 feet to the head of the incline, where it is dropped 1400 feet to the railroad and hauled 8 miles to the smelter on the San Francisco river at Clifton. Here the company owns two 250-ton water jacket furnaces, which are now being installed and will be put in operation shortly after January 1, 1902. Plans are being made for a 500-ton concentrator and a converter plant.

### MOHAVE COUNTY.

M. Redman, H. Lovin and H. L. Harris of Kingman claim that they have made a very rich discovery of gold ore in the Secret Pass country, in the Blue Ridge mountains. The vein, they say, is 20 feet wide and carries from \$10 to \$30 in values wherever opened.

### MARICOPA COUNTY.

(Special Correspondence).—The Lime Creek Copper Co., J. D. Marlar manager, has a 30-ton copper smelter at Alhambra, near Phoenix, which is to be started up the first of the year. They have also a 10-ton furnace at their mine, 15 miles east of Cave Creek, where considerable development work has been done. The ores consist of oxide, carbonate and sulphide of copper; a new shaft is being sunk to tap the ore 150 feet below present 300-foot level. A larger plant is contemplated.  
Phoenix, Dec. 19.

### PINAL COUNTY.

(Special Correspondence).—Parties in control of the Silver Queen mine, north-east of Florence, are sacking and shipping considerable of the copper ore on the dump left there when the property was worked mainly for silver. It is said much of it runs 25% copper.

The Arizona Copper Mountain Co. are developing a group of fifteen claims at Copper Buttes, 20 miles northeast of Florence, driving tunnels and shafts. A 300-foot tunnel crosscuts a vein of oxidized ore that is claimed to run 15% copper, with good values in gold and silver.  
Kelvin, Dec. 19.

### YAVAPAI COUNTY.

(Special Correspondence).—The Ardath, in Santo Domingo gulch, 9 miles east of Wickenburg, has a ledge running through a slate-porphry country rock, said to be 500 feet wide. Within the ledge are shoots and seams of lime-spar, carrying free gold. The property has a 5-stamp mill. An ef-

fort is being made to open the property and develop water.

Wickenburg, Dec. 19.

(Special Correspondence).—The Mountside M. Co. of Clinton, Iowa, are developing the property which they have acquired on Rich Hill, at Stanton. Their holdings cover a portion of this hill, and the ore bodies will be opened through a system of tunnels. Three of these have been started, the lower one proposing to cut 2200 feet below the apex of a well known vein, following the strike of the latter. George B. Upton, the company's manager, states that a gasoline power plant will be put in to generate electricity, the latter to run electric drills for the tunnel work. The ores here are a sulphide and steel galena, carrying gold. A 5-stamp mill on the property will soon start up.  
Stanton, Dec. 18.

### YUMA COUNTY.

(Special Correspondence).—The Valensuella Copper Co. of Denver, Colo., have bought and are developing a group of five claims in the Polomas range, in the Quartzite mining district, which is about 100 miles northerly from Yuma, 7 miles east of the Colorado river. The location is near the Valensuella wash, which drains into the Colorado river. The claims take in 7500 feet of a ledge which lies between a granite hanging wall and a lime foot wall. The ore body runs from 5 to 8 feet wide, the vein matter comprising copper oxides and carbonates, which are said to have sampled 24% copper and 34 in gold and silver at the surface, and 9% copper, 34 gold and 32 silver at 25 feet depth. The latter also assayed 12% iron and 15% lime.

Two incline shafts, 3000 feet apart, each following the dip of the vein, have been started. Between the two is a short crosscut tunnel which cuts into the ore body. The company expects to sink the two shafts to 200 feet depth and connect them by levels at the 100-foot and 200-foot stations.

The directors of this company are Richard Darling, F. W. Deidesheimer, G. C. Manley, C. W. Grassel and L. F. Bradshaw.

Quartzite, formerly Tyson's Wells, is a small supply point and is the name of the postoffice.

Quartzite, Dec. 20.

### CALIFORNIA.

#### CALAVERAS COUNTY.

A surveying party, under E. C. Moore of Santa Clara, chief engineer, have completed a survey for a ditch from the main fork of the Stanislaus river, near Schoettgen's range, via Murphys to Angels Camp. A. B. Thompson and G. Batten of Angels are the promoters of the enterprise. The ditch will be built to supply water for mining and electrical purposes. It will be 26 miles in length. The water will be taken across the Stanislaus river in a pipe line, 3000 feet down one hillside and up the other. It is estimated that 3,000,000 feet of lumber will be required for flumes, and the company intend to put up their own sawmill to provide it.

The people who have bonded the bed of the Calaveras river at Jenny Lind and the lands adjoining are beginning operations. Mr. Carnduff, representing them, has the prospecting plant on the ground and has begun work. The ground is to be prospected by numerous borings, which, if they develop the supposed value of the ground, will be followed by extensive dredging operations.

J. E. Doolittle, who has bonded the Cutler ranch at Jenny Lind, is also expecting to begin prospecting in a short time.

The Ilex mining property, in Rich Gulch district, owned by R. W. Petri, has been sold to J. O. Stewart, representing the Anglo-Saxon M. Co. The new company, it is understood, will commence development work at once.

The Sugar Pine mine, of the San Joaquin M. Co. of Stockton, near Angels Camp, J. McClay Supt., has been extensively developed during the last year and has had a mill installed preparatory to exploitation.

G. W. Huddleston and E. A. Angier, of New York, have been inspecting the work done on the Sultana mining property at Angels Camp, C. H. Morgan, manager.

B. R. Prince, who has been mining ground at Altaville, is under a bond to J. Hamby at \$30,000. He has organized the Altaville M. Co. with a capital of \$100,000 to operate it. A. Chalmers has been made president and manager; C. Demarest and J. Jones, of Altaville, F. J. Solinsky, of San Andreas, and H. E. Adams, of Stockton, are the officers.

Water has turned on the Maxey mine near El Dorado for the second season's run. The mine was opened last season and a short run made with excellent results. Two giants are in use. The gravel is deep, a 90-foot bank yielding gold from surface to bedrock. Last season a piece of

ground one-third of an acre in extent yielded \$5358.

### EL DORADO COUNTY.

At the Larkin mine, at Placerville, a 7-foot vein of ore has been struck on the 400-foot level on the west lode. Mr. Dunton, the Supt., says that the "rock is good milling ore," and that apparently there is plenty of it.

The Noon Day copper mine, near Diamond Springs, has been bonded by J. Q. Wrenn of Placerville and I. M. Proctor of Petaluma to the Payton Chemical Co. of Martinez, Contra Costa county, who, it is said, will at once begin active development and intend to sink 200 feet on it.

Oakland people, who have been engaged in developing the Pyramid mine, near Placerville, have bonded the Expansion mine, near the Pyramid, from B. Berns and C. McDonald, and have men at work cleaning out the ditch preparatory to the resumption of development work. A mill is to be installed at once.

At the South Slope gravel mine, near Placerville, the new hoisting machinery has been installed and the shaft is down 63 feet, with a station cut at 50 feet.

### FRESNO COUNTY.

The Fresno P. M. Co. of Fresno, A. E. Snow president and S. L. Hogue secretary, has eighty acres of placer ground on Sycamore creek, and has made preparations to hydraulic, expecting to start up Jan. 15.

### KERN COUNTY.

The Butte Lode Co., at Randsburg, has cleaned up about \$5500 from a crushing of sixty-nine tons of ore. Supt. McMahon says he is working from two shafts, about 800 feet apart, at about 150 feet depth.

G. W. Lloyd is building a new stamp mill on the Phoenix mine, at Johannesburg.

The Yellow Aster Co., at Randsburg, is running its mills to full capacity, stopping only half a day monthly. About 450 tons of ore are crushed daily and it is expected to increase the amount to 500 tons. The ore for the most part comes from the "Glory hole," a shaft on the side of Rand mountain, connecting below with the track level. All around this shaft ore is broken out and run down the shaft to the track level, thence to the mills on the tramway. The "Glory hole" is about 100 feet in diameter at the top—not all ore, but sufficiently so to make it cheaper to put it through the mill than to first sort it, throwing out the waste. During November Mr. Burcham, acting Supt., cut the Rand vein 300 feet below the surface, where it averages 6 feet wide of rich ore.

### MARIPOSA COUNTY.

An increased water flow has been struck at the Garibaldi mine at Kinsley, but so far it has been held by the skips and pumps, though said to be making something over 800,000 gallons per day. The stamp mill is almost completed, new cables have been put on the hoist, and Klondike sluices have been put in to wash the ore with the mine water before milling it.

### MONO COUNTY.

The cold weather and snow have shut off the supply of water for the mill at the Golden Gate mine, in Antelope valley, Donovan & Brown owners. The men have all been put to work getting out ore pending the starting up of the mill. The Almono M. Co., operating close to the Golden Gate mine, propose erecting a mill in the spring.

### NEVADA COUNTY.

D. B. Marwick, R. White and E. K. Smart of Grass Valley have taken an option on the State Ledge mine and several adjacent properties, and a water right of 300 inches near Grass Valley. The State Ledge mine has been worked for a number of years and has produced about \$350,000. The ledge will average 3 feet in thickness and the ore runs about \$7.50 per ton. The 10-stamp mill on the property, the hoisting works and pumps are all run by water power. The shaft is at present down 540 feet below the drain tunnel.

The Yuba mine at Maybert, which has paid well in past years, is being prospected and prepared for extensive working. A new 6-foot vein has been cut which shows well in free gold.

Supt. J. L. Bryson of the Gold Crown mine at Omega reports that while sinking the shaft a fine ore body was encountered. The rock is of high grade and the ledge of good size.

J. Tilton of San Francisco says that he expects soon after the commencement of the new year to make preparations for placing a 40-stamp mill on the Cleveland mine, near Nevada City, claiming that \$60,000 will be expended in machinery and development work. The ledge is a large one, and Mr. Tilton believes it needs a large mill, the ore being low grade.

### PLACER COUNTY.

The Azalea M. Co. at Dutch Flat has

struck good indications in the 110-foot upraise at the end of the 3400-foot tunnel. It is the intention of the company to extend the tunnel farther.

The Shady Run drift gravel mine, near Towles, is working about twenty men. W. H. Wilkins is Supt.

A. C. La Bud of Oak Bar, Siskiyou county, is completing arrangements to put his scoop dredger on the Zelma Bell river mine, 7 miles south of Colfax, on the North Fork of the American river.

### PLUMAS COUNTY.

A. E. Shinn, manager, states that his mining claim near Quincy is to be incorporated in January, 1902, as the Bluff City M. & D. Co. J. M. Shinn of Mount Vernon, N. J., has a large interest in the enterprise. Two tunnels are being driven on the ore vein, which is about 3 feet wide and runs from \$6 to \$16 to the ton.

### SACRAMENTO COUNTY.

The Gray Wing mine, near Folsom, continues to yield exceedingly rich pay dirt and the force of miners has been considerably increased. The new buildings in the vicinity of the mine give the appearance of quite a settlement.

### SHASTA COUNTY.

The Mount Shasta G. M. Co. is operating the Mount Shasta mine on Clear creek, near Shasta, and the McClure group of mines at Bully Hill. F. E. Ware is manager of both properties. The Mount Shasta, when last operated, shipped its ore by team to the smelters at Keswick for reduction. A mill and cyanide plant is now being installed on the property.

The Behrens & Leivsay mine on Clear creek, near Shasta, has opened up in a lower crosscut tunnel a shoot of high grade ore in a 3-foot ledge.

The Blue Bird mine of G. Vanderbilt and J. H. Bryant is having permanent development work done. The ore is a decomposed free milling gold quartz, assaying from \$15 to \$20 a ton.

A. Di Nola, owner of the Clipper mine on Squaw creek, near Kennett, has fifteen men employed at the mine running crosscuts and sinking a 200-foot shaft. C. C. Hartman is foreman in charge.

### SIERRA COUNTY.

Twelve men are employed at the Independence mine, on Wolf creek, near Downieville; C. M. Root is Supt. The old 8-stamp mill has been reconstructed and repaired and a test run of quartz is to be made. The property is owned by two estates and is being operated under a bond by a San Francisco company, represented by C. M. Root. The Independence ledge was worked many years ago, but has been idle for over twenty years.

The Hilo M. Co., owning the Chaparral Hill mine, near Downieville, it is reported, will soon start the mine up.

At the Ruby mine the owner, W. Wolf, has eighteen men taking out pay gravel. A nugget worth about \$75 has been found.

### SISKIYOU COUNTY.

At the Dewey mine, near Gazelle, owing to the altitude, the force has been reduced from forty to twenty men for the winter months. The Dewey, it is claimed, has been making monthly cleanups from \$1000 to \$9000.

J. Bourne, Jr., of Portland, Or., has been bonding and buying several claims at Callahans, and has altogether a large area of mining ground which he proposes to develop in the near future. Besides buying the Copper King and Copper King No. 2 from W. H. Parrish, together with the ditches and water rights, Mr. Bourne has bought from the C. P. R. E. Co. 800 acres in the same district.

F. LeMay, who has been prospecting in his claim at the head of Greenhorn, near Yreka, has pounded out about \$800 in six weeks with a hand mortar.

### TRINITY COUNTY.

At the Trinity G. P. M. Co., at the Nash deep gravel mine, near Carrville, W. Maitland Supt. and G. Hall foreman, a dam 30 feet high has been built in Coffee creek, making a storage reservoir for the hydraulic mining. A new pipe line taking water from Union creek to the mine has been put in, giving a pressure head of 365 feet. The pay gravel of the old channel has been found again by extending an old abandoned drift 100 feet farther into a highbar deposit.

### TUOLUMNE COUNTY.

The Horseshoe Bend G. M. Co. of Maine is operating a number of quartz claims on the Stanislaus, near Robinson. A gallow frame and hoist house are under construction.

The ten stamps in the mill at the Crystalline mines, near Rawhide, have commenced crushing ore and the mill is being run day and night. The gallow frame and hoist and new compressor building are under construction.

The Goldwin mine at Sonora, it is claimed, is showing good ore values in the drift south on the 500 level. The shaft is down 585 feet and sinking is progressing



at the rate of 1 1/2 feet daily. When the 600 is reached drifting north and south for the pay shoots found above will be started.

The Bourbon and Yankee Doodle quartz claims, on Knights creek, near Columbia, have been bonded by B. Signorotte and P. Capella to H. J. Sisty, and the latter has men at work developing.

The Peterson mine, at Columbia, has been bonded to R. Yuill and W. S. Murry of Victoria, B. C., who propose to begin work at once.

The App mine, at Quartz, is running, with forty stamps of the sixty being used. The shaft is being sunk from the 1000 to the 1200 level.

S. Donaldson has bought the Newcomer mine, near Columbia, and started it up.

At the Clio mine at Jacksonville work has been steadily prosecuted under A. Kleth, manager, and the working tunnel has been driven through to the ledge. This main tunnel is 490 feet long and 6x7 feet in the clear of timber sets. The tunnel, together with 50 feet of connections to old works, was driven in ninety-nine days, and in one week a record of 56 feet was made.

#### COLORADO.

##### BOULDER COUNTY.

At the Colorado Northern G. M. Co.'s tunnel at Wall Street preparations are being made to put in more machinery. A new lead has been found at 960 feet depth which is not yet fully developed. The entire length of the 7x6-foot tunnel is 2020 feet. The company has a second tunnel, some 700 feet in, about half a mile west of the main one. It is intended to make a junction of the two. The territory owned by the company approximates some seventy acres.

##### CLEAR CREEK COUNTY.

In Clear Creek county the special feature is tunnel mining. Between Idaho Springs and Silver Plume, a distance of 17 miles by railroad, there are 20 crosscut tunnels being driven, mostly from the level of South Clear Creek and the railroad into the adjacent mountains, so as to open up known mineral-bearing veins, formerly exploited by shafts. These tunnels will dispense with the cost of pumping, hoisting and wagon freight, and to some extent increase the net profit on the ore.

The following is a conservative estimate of the gross output of the mines of Clear Creek county for the year 1901:

|                        |                    |
|------------------------|--------------------|
| Georgetown .....       | \$ 200,000         |
| Silver Plume .....     | 320,000            |
| Empire .....           | 250,000            |
| Lawson .....           | 50,000             |
| Dumont .....           | 50,000             |
| Yankee and Alice ..... | 50,000             |
| Idaho Springs .....    | 2,000,000          |
| <b>Total .....</b>     | <b>\$2,920,000</b> |

Of the Idaho Springs figures \$1,600,000 is estimated as smelting ore and \$400,000 in mill ore. The records show lode locations for the year, 1122; mill sites, 80; tunnel sites, 45.

The Western Mines Dev. Co. has let a contract to F. Nelson of Georgetown to drive 250 feet on the new level started on the Anglo-Saxon Extension group. The conditions are to work two shifts and drive not less than 60 feet per month.

The S. & S. Co. has been incorporated to work mines on Red Elephant mountain near Lawson. The company is now driving a tunnel on the Tabor vein, which will cut under the mountain for over 1000 feet and drain a number of silver mines which are in a consolidation perfected by P. R. Stanhope. A plant of machinery, including power drills, has been put in.

The Gold Anchor mine, at Yankee, has been bonded to T. Slater, representing Chicago and Indiana people. The shaft is down 150 feet, the bottom showing 15 inches of \$200 ore. A heavy flow of water was encountered in the shaft, and a tunnel has been started and is in about 400 feet to drain it. As soon as new machinery en route is installed development work will be continued.

Berg & Co. are employed in cleaning up the Silver Glance, at Georgetown, which they recently unwatered through a crosscut tunnel driven several hundred feet. The old workings are in bad shape and it requires much labor to make them safe. On the fifth level a good-sized vein of mineral is now showing. This property was first abandoned fifteen or twenty years ago, but in 1890 C. E. Davis of Empire sunk a shaft and took out \$100,000. The ore is high grade and occurs in large bodies.

Preparations are being made for the resumption of work on the Mint, located on McClellan mountain, at Georgetown. H. W. Ross, representing Eastern parties, who are interested, and D. Kirby, who is to have charge of the work, have had buildings constructed and machinery and supplies hauled in.

W. E. Renshaw is taking out 1000 tons of ore per month from the vein in the

Newhouse tunnel, at Idaho Springs. Values are said to have improved, and it is expected to ship smelting ore. The stopes are carrying about 6 feet of mineral. In the surface working the lessees are taking out a fine grade of smelting ore.

##### EL PASO COUNTY.

The Recovery G. M. Co. has been incorporated by H. A. Watson, F. T. Sanders and O. H. Shoup at Colorado Springs. The capital is \$1,000,000, and the company will operate in Colorado and South Dakota.

##### FREMONT COUNTY.

The discovery of a large body of wolframite ore, running 72% in tungstic acid, is reported near Wilbur. The United States Steel Co. have bonded it and is now preparing to develop by an 800-foot tunnel to intersect the vein 600 feet below the outcrop on the summit of the mountain. Mr. Heaton, manager, is installing machinery.

##### GILPIN COUNTY.

The Mingo Co., near Central City, has reached the bottom of the shaft, which is down a little over 200 feet, and has let a contract to sink 100 feet deeper. Assays of the ore found in cleaning out the shafts and levels give ten to twenty ounces gold per ton. The property is in the lower part of the Lake district.

The shaft of the Plattsburg mine of the Cashier Mines No. 1, at Central City, has been retimbered a distance of 400 feet, and the company is preparing to sink 100 feet deeper. The dead work has shown up considerable ore. A shipment recently made gave \$175 per ton for the first class, the second class giving \$104. About forty-five men are employed.

At the California mine, at Central City, the Patch M. Co. is drifting in the 2100 and 2200-foot levels, said to be the deepest workings in the State of Colorado. At the Hidden Treasure mine, also operated by the Patch M. Co., a small force are at work in the 1600-foot level, taking out both milling and smelting ores.

R. Sykes, president of the Kansas-Burroughs Con. M. Co., reports that during November his company shipped from their properties on Quartz Hill, at Central City, 230 tramway cars or 2000 tons of ore to the Black Hawk custom stamp mills for treatment, besides smelting ore to Denver, the latter, however, being but a small proportion of the entire product.

##### GUNNISON COUNTY.

The Harris-Fairley C. M. & S. Co. of Aspen has been incorporated to do mining in the district surrounding Marble. F. Meyer is president, J. C. Ferris vice-president, and O. S. Moore secretary and treasurer, all of Aspen. The new company owns copper properties on Crystal mountain and will buy other mines, and contemplates the erection of its own smelting plant.

##### LAKE COUNTY.

A rich strike is reported on the Thompson lease from the Bohn M. Co. at Leadville. The Bohn Co. has a lease on all that part of the Starr placer which belongs to the St. Louis S. & R. Co. J. Newell is manager.

A new shaft is to go down on the Star of the West claim at Leadville. The shaft will be put down 500 feet to open up the lower contacts. G. H. F. Meyer is manager.

The Cloud City mine at Leadville has developed ore that will run from \$3 to \$3.25 on board cars. There is a considerable sized body of the ore and the assays show iron 15.8%, manganese 32.4%, silica 9%, and silver 1 oz. The ore was found in an upraise in the south drift, where a shell of hard flint was broken through into it.

##### MESA COUNTY.

The Unawep Copper M. & M. Co. of Lynn, Mass., G. H. Allen, president, and J. V. Howard, secretary, is building a quartz mill in Unawep canyon, 40 miles from Grand Junction. The mill is to have a capacity of 50 tons daily. W. C. McCurdy is manager and F. E. Blaisdell Supt.

##### OURAY COUNTY.

Work on the Black Cave property, near Ouray, is to be continued on a more extensive scale. J. Harkins is manager.

##### ROUTT COUNTY.

T. E. Kleckner, manager of the Hahn's Peak & Leadville M. & Inv. Co., operating at Columbine, says his company are about to install a new plant of machinery to cost \$10,000.

##### SAGUACHE COUNTY.

T. J. Downer and L. H. Jansen of Colorado Springs have bought the Hazard mine at Crestone. A large amount of development work has been done and three veins uncovered. Assays are high in gold, silver and lead.

##### SAN JUAN COUNTY.

The Kendrick-Gelder S. Co. of Denver has paid dividend No. 2, amounting to

\$10,000. The pyritic smelter, concentrator and mines of the company are located at Silverton. The ore bodies are very large. Improvements have been lately added to the smelter, so that in the spring the output is expected to be increased.

E. Johnson, J. R. Curry and A. Larsen, who own and are operating the Iron Magnet mine, near Silverton, are finding some of the same kind of ore that made that property famous in the early days. The middle tunnel is now in 800 feet, about 600 feet of which is on the 3-foot vein. Tests show the entire width of the vein to run about \$10 per ton, mostly in silver, and the sorted product brings \$60 per ton at the smelter.

The National Belle mine at Red Mountain, near Silverton, is being retimbered, cleaned up and put in working shape by a small force of men. The later production of crude ore from the mine has given returns of 65 per cent lead, and copper ores ran 22, 25 and 27 per cent to the ton. A large body of massive iron and copper and sulphides, containing gold and silver, has been struck.

##### SAN MIGUEL COUNTY.

The force employed in the Japan mine, at Telluride, has been increased and about 40 men will be employed during the winter, wholly in development work. The buildings and plant at the tunnel destroyed by fire a year ago have been replaced and a compressed air plant installed. The tunnel cuts the vein about 500 feet below the Japan shafts, draining the property.

##### TELLER COUNTY.

The following Cripple Creek companies pay December dividends to their stockholders, distributing the following amounts:

|                               |                  |
|-------------------------------|------------------|
| Stratton's Independence ..... | \$244,000        |
| Consolidated Co. ....         | 190,000          |
| Elkton .....                  | 100,000          |
| Last Dollar .....             | 30,000           |
| Gold Coin .....               | 30,000           |
| Strong .....                  | 25,000           |
| El Paso .....                 | 24,500           |
| Midge .....                   | 15,000           |
| New Zealand .....             | 7,650            |
| Modoc .....                   | 5,000            |
| <b>Total .....</b>            | <b>\$671,150</b> |

F. G. Whipp says he will resume operations in January on Mineral Hill, at Cripple Creek, on the property of the Sun Con. Co. In the past he has performed considerable work there endeavoring to locate the lead from which the placer gold of Mineral Hill has come.

The report of John Hays Hammond, consulting engineer of the Stratton's Independence, Limited, says of the property during the period from Nov. 23, 1900, to Sept. 30, 1901, that the total net dry tons of ore extracted were 66,199,685; gross value, \$2,506,862.46; freight and treatment, \$604,823.40; net value, \$1,902,039.06; revenue from royalties, etc., \$31,560.92; all expenses, \$866,599.74; profit, \$1,067,000.24; total cost of mine development, \$213,867.60. In his report of Nov. 23, 1900, he estimates the ore reserve at 120,000 tons of crude ore valued at \$19.16 a ton, and a total gross value of \$2,300,000, which would yield a net profit of \$1,000,000. This reserve has been materially increased by developments since. Because of the healthy condition of the property and in view of the development outlined, he recommends an increase of dividend rate to 20%.

The Des Moines G. M. Co. has leased on the north end of their Bob Tail claim to A. G. Ladue of Anaconda for three years, at royalties graded between 12 1/2% and 25%, according to the value of the ore shipped and for 50 shifts of work each month. Mr. Ladue will sink a shaft 200 feet on the claim, where he has been prospecting for some time.

The Glorieta M. & Leas. Co., operating the King and Whiting lease on the Hull City placer, at Cripple Creek, proposes to install a larger hoisting plant and put cages in the shaft, which is now down 1050 feet.

The Mint Con. M. Co., at Cripple Creek, states that from July 5, 1901, to Dec. 10th the Pointer Co. shipped 27,185 tons of ore, average value \$78.04 a ton, and the lessees 80,410 tons of dump ore, average value \$14.96 per ton, making total gross product of \$131,164.34. The Mint Co. shipped from the same ore shoot, from Aug. 19, 1901, 708 tons, average value \$46.01 per ton, total \$20,694.52, and a total for the two companies of \$151,858.86.

The New Bedford M. Co. of Boston, Mass., M. M. Thayer, manager, operating a tunnel on Cow mountain, at Cripple Creek, have cut ore at 700 feet which assays from \$17 to \$38 across 20 feet of width. The company owns 40 acres in this territory.

The annual meeting of the Acacia Co., Colorado Springs, elected J. E. Hundley, president; K. McKenzie, vice-president and general manager, and W. P. Sargeant, secretary and treasurer. Manager

McKenzie's annual report shows receipts from royalties amounting to \$29,565.73, from which \$5649.38 had to be deducted as operating expenses, leaving the cash balance of \$23,916.35 on November 29.

J. G. Berryhill of Des Moines, Iowa, has made a first payment on the Roxanna Co.'s property, adjoining the Doctor-Jack Pot, at Cripple Creek. The holdings comprise the North Star and Mountain Monarch claims, about eighteen acres. It is said that the price is close to \$300,000.

A lease and bond have been granted on the Colorado City claim of the Amazon Co. at Cripple Creek to Foster, Udick and associates for two years at a royalty of 20%.

Lyons and associates, composing the Muriel M. Co., operating on the dump of the Elkton mine at Cripple Creek, are sending twenty-five tons a day to market, the value of which is estimated to be in the neighborhood of \$25 per ton. The dump is estimated to contain 150,000 tons of rock, for which the lessees pay to the Elkton Co. \$1.50 a ton and agree to take away all the rock under a forfeit of \$5000. Mr. Lyons estimates that they will be able to extract 50,000 tons of pay rock.

#### IDAHO.

The Idaho Southern M. Co., limited, of New York, has been incorporated at Albany, N. Y., to mine in Idaho, capital \$100,000. Directors, A. M. Poole, W. T. Pendleton and E. Purcell of Albany, N. Y.

##### ADA COUNTY.

The Daisy M. Co. at Boise, which has been equipped with a 10-stamp mill and has been running for some time, is to be enlarged next season. G. W. Bredehoff, manager, says that with his present equipment he is treating from twenty-four to twenty-seven tons of ore daily, and from the plates averaging \$14.15 per ton, while concentrates bring an average of \$70.

##### BLAINE COUNTY.

The Wood River M. & D. Co. of Hailey has bonded the War Dance claim to H. P. Taylor of Hailey and E. B. Jones of Denver, Colo., representing a company organized by the latter. The price to be paid for the War Dance group is \$40,000.

Supt. Courtney of the Liberal mine at Hailey states that another rich body of ore has been found. The ore body in the Liberal was in contact with a porphyry dyke and a crosscut was made on the 150-foot level across this dyke and the new ore body run into at about 50 feet. The extent of the new find is not yet known.

The Grey Eagle, No. 1, owned by J. T. Mitchell, at Landore, reports a strike of a fine body of gold and copper ore which is said to be about 4 feet wide.

P. W. Johnson of Council has bonded some Salmon river mining properties and is making arrangements to do considerable development work during the coming season.

##### BOISE COUNTY.

The Checkmate mine at Pearl is to be transferred to Chicago people, represented by Governor Hunt, at a price understood to be \$150,000. By the terms of the arrangement \$50,000 is to be paid by March 1, 1902, when the property will be turned over to the new owners. The present owners of the Checkmate are E. E. Calvin, J. H. Young, J. D. Carnahan of Ogden, Utah, and several others. This property is said to have paid for itself and for all development from the start, and has returned handsome dividends.

The Friday mine, owned by J. C. Hill, bonded to B. F. Parish and operated by him for a few weeks, has been bought and finally transferred. At the bottom of the shaft a drift has been run 60 feet developing a large body of good grade ore. A large portion of the ore is shipping grade and the balance will be concentrated.

The complications that closed down the Friday mine at Pearl have been cleared and the property is to be started up in the spring with a milling plant. N. J. Sorensen, who was in charge of the mine at the time it closed down, has secured title to the entire property and will reopen it.

##### IDAHO COUNTY.

C. W. Colby and L. D. Harding of Lewiston have bonded the San Francisco group of claims in Buffalo Hump at \$25,000 for ninety days. Colby & Harding expect to proceed with development work in the spring.

S. E. Edwards of Boise says cinnabar is to be found in the Thunder Mountain country in quantity. A claim has been located by P. Smith. The ore specimens brought out, it is estimated, run 35% quicksilver. The entire ledge, he thinks, will run from 5% to 20% "quick." The vein is 10 to 15 feet in width, with no regular defined walls.

The Ella Hill G. M. Co. has been incorporated in Salt Lake City, Utah, capital \$25,000, with J. W. Burton, president, and E. A. Wilson, secretary and treasurer. The company owns the Ella Hill, Colum-



bia, Independence, Ajax and North Pole claims in the Neil mining district.

The Buffalo G. M. & M. Co. of Lewiston is making development of an extensive character, and on completion of the work now planned expects to be in shape for the installation of a mill.

The Montana-Idaho M. & Com. Co. has bought the Crooked creek placer mines and also the Dixie town site from E. B. Simmons and T. Bowlman at a price said to be about \$100,000. The new owners, Spokane, Wash., and New York men, plan improvements that will make a large placer enterprise.

#### KOOTENAI COUNTY.

H. Desgranges of Spokane, Wash., who is interested in Santa camp, says a rich strike has been made in the Iron Cap, in about 175 feet. The quartz is almost decomposed and carries coarse gold.

#### SHOSHONE COUNTY.

The owners of the Champion mine, at Mullan, have struck high-grade copper and gold ore in the lower tunnel.

The Powhatan M. Co. at Wallace has elected A. D. McKinlay president, W. Fishinger secretary and treasurer and M. Gaut manager. It is expected that work will be resumed early in January.

The Hercules mine at Wallace has shipped its eighth car of ore and it is understood that the eight cars will produce a net profit of \$20,000 above expenses. The ore is shipped to a smelter at Perth Amboy, N. J., and freight and smelter charges are \$36 per ton.

#### MONTANA.

##### JEFFERSON COUNTY.

The Colorado M. & Dev. Co. at Corbin claims that a 2-foot body of very fine ore has been struck in a drift now in about 50 feet. Manager Heilbronner says that a new boiler has just been added to the battery and that an additional 100 feet will be added to the shaft at once.

C. K. Gile has bought the interest of Haggerty Bros. of Butte in the Helper and Basin claims at Basin. Both claims are said to carry good values in gold.

##### LEWIS AND CLARKE COUNTY.

C. L. Fredericks, of the Columbian group of mines near York, has ordered a 50-ton cyanide plant to handle the tailings of the Columbian 10-stamp mill, which saves values from \$5 to \$6 per ton. The installation of the cyanide plant, it is estimated, will increase the average of the ore to about \$10 per ton. The mine is now being worked from the 300-foot level.

The report of the Montana M. Co., Limited, for the half year ending June 30, 1901, shows that 30 stamps of the 60-stamp mill were in operation during the entire half year and reduced 12,222 tons of ore from the mine. The yield in bullion was \$57,605, or an average of \$4.71 per ton. The expenditure on mining and milling, averaging \$4.42 per ton, amounted to \$54,122, the net realized profit being \$3,483. The expenditure for prospecting, operating shafts and general developments, amounted to \$47,404, the net result being a loss of \$43,921. From April 6 to June 30, 1901, a total of 31,710 tons of tailings was given cyanide treatment, realizing \$79,304, an average of \$2.50 per ton. The expenditure on tailings account amounted to \$37,410, or \$1.18 per ton, and the net profit was \$41,893, or an average of \$1.32 per ton.

##### MADISON COUNTY.

A. Lindfors, foreman of the Kennett mine, near Summit, states that the Kennett has been shut down for the winter, the pumps having been pulled. In the 600-foot level a 4-foot body of sulphide ore, carrying a high value in gold, has been struck. The Kennett 60-stamp mill, he says, will not treat the new body of ore, as the mill was built for free-milling ore.

##### SILVER BOW COUNTY.

The number of men employed in the different large mines in Silver Bow county, as reported by the State Mine Inspector, is as follows:

|                                 |       |
|---------------------------------|-------|
| Boston & Montana Co.            | 1,255 |
| Anaconda C. M. Co.              | 2,333 |
| Butte & Boston Co.              | 510   |
| Colusa-Parrot M. Co.            | 441   |
| Montana Ore Purchasing Co.      | 778   |
| Colorado Smelting & M. Co.      | 324   |
| Parrot S. & C. Co.              | 268   |
| Speculator M. Co.               | 229   |
| Washoe C. Co.                   | 143   |
| Farrell Shafts No. 1 and No. 2. | 39    |

Total.....6,320

Close estimates of the value of the base and precious metals produced by the Butte mines this year aggregate in value \$43,160,000. The output of some of the larger copper companies in pounds of copper is: Anaconda and Parrot companies, 125,000,000; Boston & Montana, ten months, 55,000,000; Montana Ore Purchasing Co., 25,000,000; Butte & Boston, 14,000,000; W. A. Clark Co., 20,000,000;

Colorado Co., 13,000,000. The gold and silver product is valued at about \$3,000,000. The St. Lawrence mine, one of the Anaconda properties, which has been closed down for several months, has been started up with a small force of men, which will be increased as soon as the ore can be handled by the new smelter.

#### NEVADA.

##### DOUGLAS COUNTY.

The Carson Valley S. & R. Co., it is reported, is soon to be incorporated with capital of \$100,000, with head office at Gardnerville.

##### ELKO COUNTY.

The Dexter M. Co.'s annual report on mines and mills at Tuscarora shows a production of gold bullion, gold dust and gold-bearing ores amounting to \$167,901, and expenses \$163,696.69. Supt. McKenzie in the report notes 35,000 tons of milling ore above the 250-foot level, and 53,000 tons of slimes, to which is being added thirty-five tons daily. A sampling of the slimes for November, 1901, showed an average value of \$11.20 per ton, while the average since June 1st last is \$8.25 per ton. With a plant adapted to the treatment of its slimes the superintendent says that 95% of the gold values and 75% of the silver can be recovered at a cost not exceeding \$1 per ton, and he recommends this equipment, which will be provided next spring. He also recommends the treatment of the tailings from the cyanide plants, of which there are 85,000 tons, of a valuation of \$3 per ton. E. H. Airis is president and G. E. Airis secretary, with offices at Salt Lake City, Utah.

##### HUMBOLDT COUNTY.

J. A. Williams of Salt Lake City, Utah, says the Morrison mine at Humboldt House has a vein from 10 to 12 feet wide, all carrying milling values in gold, silver and copper. He has bonded the Del Monte mine at Humboldt House. It is said to carry good values in silver, chlorides and bromides from a vein 8 inches to 2 feet wide.

Development work is being done on both properties.

##### LANDER COUNTY.

J. W. Fox and A. E. Hyde, of Salt Lake City, Utah, associated with Eastern people, have bought the Iron mine group near Eureka for \$55,000 from W. M. Bradley, J. Johnson and V. H. Pease. The property involved in the deal has been under development for some time, and, it is said, shows 10,000 tons of ore that will average \$21 per ton in gold. It is the intention of the buyers to begin at once the erection of a mill with which to treat the ores.

##### LINCOLN COUNTY.

The April Fool Co. of DeLamar has elected W. S. Godbe president and D. L. Wertheimer secretary. Experiments on new devices for more efficient treatment of the ores are being made, and the mill will be equipped and the leaching of ores proceeded with.

##### LYON COUNTY.

It is proposed to resurrect the old Carson River P. M. Co. and expend \$20,000 in new barges and dredging equipment by means of which the tailings from Comstock ores deposited along the Carson river bottom are to be recovered and treated by the cyanide process.

##### NYE COUNTY.

The ore production of Tonopah, it is stated, has blocked every smelter on the Pacific coast, each of them having several months' supply ahead. The Tonopah company has made arrangements with Capt. Davis, of the Black Point mill, at Dayton, to run his mill exclusively on Tonopah ores.

##### WASHOE COUNTY.

Work has been resumed upon the Bonanza mine, near Reno, by the owners, Stoddard, Boney, Gooding and Miller. The Bonanza is a quartz proposition carrying gold and silver, with a little copper and lead.

The first payment has been made on the purchase of the Blue Jay, Bald Eagle, Fan Tail, Harry R., Great Eastern, R. D. R. and Flying Dutchman copper claims on Granite Hill, near Reno. The new owners expect to do extensive development work in spring.

It is reported that a strike has been made in the Wheeler shaft at Wedekind. The ore, it is said, is to all appearances the same that was encountered in the Wedekind and Bell shafts, a couple of hundred feet away.

A bar of gold and silver bullion weighing thirty-six pounds was the result of a run of ten tons of ore from the Reno Star dump at Wedekind, an average of 2000 tons now on it. A ten-ton test by roasting process will be tried.

##### WHITE-PINE COUNTY.

A rich strike is reported as having been made by John Biale in one of his claims in

Newark mining district. The ore is said to carry silver and a high percentage of lead.

M. Martin of New York has organized a company, capital \$15,000,000, to develop his properties at Ely. The mine workings are in rich sulphide ores of copper, and deep mining, it is believed, will show bigger ore deposits.

#### OREGON.

##### BAKER COUNTY.

A strike has been reported at the Phoenix mine, in the Greenhorn district, near Baker City, consisting of a pocket of exceedingly rich ore. The Phoenix mine was recently bought by Parker & Crawford, of Chicago, Ill.

W. H. Washburn reports the completion of the new 25-stamp mill of the Hoosier Boy M. Co., at Prairie Diggings, which he says is now running on ore which comes from a ledge 200 feet wide, all of which is run through the mill. Mr. Washburn says that while some of the ore is high grade, the major portion is a low-grade proposition.

##### JACKSON COUNTY.

J. B. Scott & Co., who have been developing a quartz mine in Humboldt district, near Jacksonville, for several years past, have let a contract for running a 500-foot crosscut tunnel to S. T. Sandry.

A number of farms and mines on Missouri Flat, near Jacksonville, aggregating about 2000 acres, have been bonded to Chicago, Ill., and London people, who propose to bring water in from Applegate creek to mine the ground.

##### JOSEPHINE COUNTY.

The Victory M. Co. has sold its mine on Cow creek, near Grants Pass, to the Oregon Con. M. Co. for, it is reported, \$25,000. Interested in the new company are T. Carroll of Tacoma, Wash., W. J. Morphy of Chicago, Ill., G. A. Cole of Missouri and F. Eldomuller, D. Phelps, F. H. Miller and A. N. Mills of Oregon. The property includes the Victory hydraulic mine, with a 3½-mile ditch.

Three new quartz ledges have been discovered in Josephine county of late. One was in the Coyote Creek district, northern Josephine, where R. Huysink, a miner, has uncovered a 4-foot ledge that gives average assay values of \$18 per ton. Two other strikes have been made by W. E. Markham and C. W. Gerboth on Rogue river, 14 miles below Grants Pass. One ledge has a width of 4 feet, carrying average values of \$18 per ton, and the other a width of 1 foot, carrying an average value of \$20 per ton.

A rich ledge has been uncovered on Tip Top mountain, of the China creek district, near Grant's Pass. Mr. Jennings, of Grant's Pass, has opened a 12-foot ledge at a depth of 120 feet in an open cut on the mountain side. Samples of rock gathered from the strike, he claims, show \$96 per ton.

A sampling of ore from the Mammoth quartz ledge recently discovered in the Dry Diggings district, near Grant's Pass, by Pike & Perkins, shows, it is said, from \$2.44 to \$6.96 per ton, sulphurets and free gold. This gives an average assay value of \$4.74 per ton, of which \$2.38 is free gold. The ledge is claimed to be from 200 to 250 feet wide. The discoverers have a force of men at work developing.

The Osgood hydraulic mines at Waldo, developed by F. H. Osgood of Seattle, have begun operations for the winter, using three giants both night and day.

The Angel placer mines, situated in the Upper Galice Creek district, near Grant's Pass, have been sold by Jackson & Call to W. Gebhart, of Idaho, and J. H. Rogers, of Michigan. The property is in course of development.

At the Baby quartz mine, in the Louse Creek district, near Grant's Pass, the mill is said to be crushing rock that is averaging \$25 per ton in free gold and sulphurets.

A new hydraulic mine has just been started up on Louse creek, near Grant's Pass, by Jefferson Bros.

##### LANE COUNTY.

A rich strike has been made in the Lucky Boy mine, at Lucky Boy. It is reported that a 4-foot ledge has been uncovered for 500 feet that gives ore that assays several hundred dollars to the ton.

##### NEW MEXICO.

##### COLFAX COUNTY.

J. C. Scully of Elizabethtown has decided to build a dredger on the Moreno river. Mr. Reiling will also construct another dredger, and the building of an electric power plant is projected to furnish power to the three dredgers.

##### GRANT COUNTY.

The Mineral M. Co. has decided, it is reported, to erect a concentrating plant at Stein's Pass, to work on copper ore coming out of its mines at that place.

The Metallic C. Co. of Arizona has bought 100 acres of mineral land at Santa Rita.

#### LINCOLN COUNTY.

The stockholders of the Iowa & New Mexico M. & M. Co., of Nogal, are considering the putting of a hoisting plant on their Turkey Creek property, and a reduction plant at Schelerville.

#### SANTA FE COUNTY.

The Gibson Dev. Co. on its mining property at San Pedro, 88 feet down, has struck a blanket body of quartz cutting the formation, which carries well in gold.

#### SIERRA COUNTY.

The American Dev. & Construction Co. has been incorporated at Colorado Springs, Colo., capital \$400,000, with John Hays Hammond and F. Baker of London, H. A. Butters of San Francisco, Cal., H. S. May of Denver, I. W. Bonbright, L. E. Curtis and H. Hine of Colorado Springs as directors. The company will operate at Lake valley.

#### SOCORRO COUNTY.

The Abbey M. Co. has been incorporated and is operating in a new mining district 25 miles north of Magdalena, under N. Hall, manager. The company owns thirty copper-bearing mining claims. At the 100-foot level of a shaft on one of the claims a body of a good grade of copper ore has been struck. The shaft will be sunk to 600 feet. The company also owns a tract of bituminous coking coal land near to the copper mines. Machinery for the mines and reduction works are to be installed.

#### TAOS COUNTY.

I. T. Burns of Taos has started up work on the Gold King and Gold Queen mines, at Red River.

It is reported that the June Bug M. & M. Co. has sold its mill and mines at Red River.

I. W. Rolly has been given the contract to sink 100 feet on the Homestead property, near Red River.

#### SOUTH DAKOTA.

##### CUSTER COUNTY.

(Special Correspondence).—The Wabash M. Co., owning a group of claims 8 miles west of Custer, have completed their mine buildings, and have installed a large steam hoist and compressor plant. About ½ mile from the mine the company is building a 20-stamp mill and cyanide plant.

On the property there are seven veins, which have been opened at the surface within 200 feet of the main working shaft. They propose to cut these by drifts at each 100-foot level in the shaft. The officers of the company are Milwaukee, Wis., people. J. F. Sidey is manager, and Prof. E. Fink, consulting engineer and chemist.

At the North Star mine, near Custer City, ore is being taken from the 300-foot level. It is reported that the company will erect a mill in the spring. Supt. Lemmon has charge of the work.

The Black Hills Porcelain & Marble Co. is opening a marble quarry near Custer, and is opening a mine of lithograph stone. The company is shipping mica from two mica deposits, also in this district. The officers of the company are R. B. Noble, president, and C. E. Nason, Supt.

The Crown mica mine is being worked continuously. The new shaft is down 92 feet. F. C. N. Graydon is Supt.

The Clara Belle mine, at Oroville, is operating a small mill on ore that is claimed to maintain a yield of \$20 per ton, free milling. The tailings are being saved for future treatment by cyanide. Frank Hebert is Supt.

The Copper Butte M. Co., located 12 miles north from Custer, is preparing to prospect with a diamond drill to develop a large vein, which assays near the surface 7% copper and 4% tin. Harry Francis, Supt.

##### Custer, Dec. 12.

An electric drill has been installed at the Crown Mica mine at Custer, and a new shaft is being sunk. The mine is owned by the Chicago Mica Co., which claims to be increasing its product by a process of cementing together small pieces of mica, forming any sized block desired. The Crown mica mine, it is claimed, has produced blocks of mica that would cut sheets 24 inches square, which have sold from \$3 to \$10 per pound.

##### LAWRENCE COUNTY.

The Clover Leaf M. Co. has commenced sinking its main shaft deeper. A hoisting plant and pump have been installed. The company is operating the Uncle Sam mine, on Elk creek, at Perry. Many new houses are being built. The Clover Leaf Co. is principally owned by Wibaux, Mont., people. S. W. Russell, of Deadwood, is the manager.

Bullion is now being turned out again from the Golden Slipper mine, which was recently bought by the Empire State M. Co. A small mill is being operated, and it is stated that this mine has paid the cost of development work from the grass roots down. The company now operating it has blocked out sufficient ore to warrant



the erection of a 20-stamp mill, for which it is stated that negotiations are being made now.

Now that the North Star M. Co. has made a mine out of its proposition near Custer, negotiations are being made for the erection of a plant of some sort to treat the ore. It is stated that bids will be asked for about the first of the year for the construction of a stamp mill, concentrating and cyanide annex which will be installed immediately. Omaha people are interested almost entirely.

A 300-ton cyanide plant has been planned to be erected in the Ragged Top district by the Colorado-Dakota M. & M. Co. of Denver, work to be commenced early in the spring. It will be located at Ross springs.

Wasp No. 2 M. Co. of Deadwood, which started with a 50-ton cyanide plant, has since enlarged it to 100-ton daily capacity. The plant, it is stated, has already paid back several times over the original cost of the cyanide mill in dividends. J. Gray of Terryville is manager of the mine.

#### UTAH.

##### BEAVER COUNTY.

The Majestic Co.'s last shipment of five cars of ore from the O. K. claim at Milford sampled 41% copper, 4.3 ounces silver and 2.80 cents gold to the ton, with silica only 4.2%, against 24% iron. This ore was mostly taken from the 200-foot level.

The Bowie M. Co. has been incorporated in Salt Lake City, capital \$50,000. The officers are J. W. Solly president and treasurer and O. W. Moyle secretary. The company owns the Solly Nos. 1, 2 and 3 and Nabob and Nabob No. 2 in Beaver county.

##### JUAB COUNTY.

Connection between the workings of the Tetro M. Co. and those of the Godiva of Tintic has been effected on the 500-foot level of the Godiva. The ore into which the Tetro has come consists, says Supt. R. Brown of the Tetro, of galena and lead carbonate. The vein should extend through the entire width of the Tetro's territory, or 1200 feet, having struck into it from the Godiva.

##### SALT LAKE COUNTY.

At the Miner's Dream at Bingham, recently bought by the Bingham Con. M. Co. for \$35,000, a strike has been made 150 feet down of over 4 feet of red and black copper oxides, going 40% copper. This shoot occurs in a vein that is about 40 feet between walls and in an ore body that averages 6% copper, with some values in gold and silver.

A controlling interest in the stock of the Butte & Bingham Co.'s property, near Bingham, has been sold by Butte, Mont., people to Eastern men for \$30,000. The ore of the property carries copper, silver and gold; but the former metal predominates. It is understood that the new owners intend to prosecute extensive development work in the property.

#### WASHINGTON.

##### FERRY COUNTY.

R. E. Willoughby, Supt. of the Golden Reward mine at Bodie, has started work on the Bodie tunnel by contract. In February, he says, the directors will be at the mine and decide on future plans.

##### STEVENS' COUNTY.

The Valley Marble Co. has been incorporated at Spokane, capital stock \$150,000, by A. S. Crowder, F. C. Goodin, H. P. Palmer, M. Kulzer and W. W. Tighman. The company proposes to develop a marble quarry recently discovered near the town of Valley.

#### FOREIGN.

##### BRITISH COLUMBIA.

E. Kennedy & Co., for English people, have bought the Dubrovnik claim, near Rossland, from F. H. Pokorny, E. Tersick and S. J. Brailo.

The Slocan Star M. Co. has brought suit against the Byron N. White Co. over mining claims at Slocan. The latter company owns land which is crossed beneath the surface by a rich silver-bearing vein which outcrops above on the mining claim belonging to the Slocan Star Co. The point at issue is the extralateral rights from the apex ownership. This extralateral right was granted under the old mineral laws of British Columbia. Later laws and court rulings on the subject run otherwise. The plaintiffs have secured an order to examine the defendant's underground workings.

It is reported that preliminary surveys have been made by the Britannia C. Co. for a 600-ton concentrator at the Britannia mine on Howe sound, near Vancouver, and that work on the plant will begin in the spring. A tramway and wharfs will be built and the total improvements to be made will cost \$250,000.

A. C. Garde, manager of the Payne mine at Sandon, states that at the Payne

mine he is connecting the long tunnel at the 800-foot level with an upraise. Meanwhile the mine is shipping steadily. The experiment of installing electric drills at the mine has proved successful.

A report is made of a strike at the True Blue mine, J. C. Drewry of Rossland manager. The vein of high-grade copper ore that was 16 inches wide in the upper workings has been found in the intermediate tunnel 5½ feet wide.

A. Laidlaw, representing G. R. Thamer of Chicago, Ill., has bought from R. C. Graham the Queen of Sheba mine in Carmi camp, up the west fork of Kettle river.

#### MEXICO.

J. N. Walsh, Supt. of the Sonora M. & M. Co.'s mines at Tubutama, Sonora, states that a strike of a body of rich ore, running from 50 to 545 ounces per ton in silver, has been made in La Fortuna mine, owned by the company. A trial run of the ore by smelting, it is said, has turned out satisfactorily, and a fifty-ton smelter has been ordered.

The Grand Central mine and mill at Minas Prietas, after having been shut down for more than a year, has been started up and is expected to run steadily. G. Carey has been made mine foreman.

T. M. Yerkes of Santa Ana has sold to the Lozier M. Co. of Arizona the Cajon de Amarillas and Yaqui mines near Cieneguita, in the Altar district. Mr. Yerkes has done a great deal of development, sinking nine shafts, four of them more than 100 feet each in depth, and two exceeding 250 feet, all exposing large bodies of free-milling gold ore. In the bottom of the deepest shaft the ledge exceeds 11 feet in width. A 40-stamp mill will be erected, so it is stated, as soon as the necessary machinery can be assembled. H. A. Lozier of Cleveland, Ohio, is the president and principal stockholder of the company.

#### Personal.

JESSE GRANT is Supt. of a quartz mine at Yreka, Cal.

W. H. WILKINS is Supt. of the Shady Run Drift mine, near Towles, Cal.

T. L. ODDIE, of the Tonopah M. Co., at Tonopah, Nev., is in Philadelphia, Pa.

M. J. FLYNN is now Supt. Great Boulder Perseverance mine, Australia.

B. DELERY has been appointed Supt. of the Republican mine at Jacksonville, Cal.

H. BARNER has succeeded G. Abrams as foreman of the Dorleska mine, at Carrville, Cal.

M. MCILLWAIN has been appointed Supt. of the Dorleska mine, at Carrville, Cal.

A. J. McDONNELL succeeds Supt. Kyle in charge of the Sierra Nevada mine, Virginia, Nev.

R. H. CHANNING, Supt. of the Highland Boy mine at Bingham, Utah, is in New York.

H. FRANKLIN, manager of the Golden Reward M. Co., of Deadwood, S. D., is at Pittsburgh, Pa.

R. GEMMEL, Supt. of the Clement mines in Sonora, Mexico, is sojourning in Salt Lake City, Utah.

WM. DAVIES will have charge of the work on the Howe-Manhattan property, De Lamar, Idaho.

J. F. WARDNER has been appointed manager of the Keating copper mines, near Clifton, Ariz.

G. CAREY has been appointed foreman of the Grand Central mine at Minas Prietas, Sonora, Mexico.

W. H. GILMORE has been appointed Supt. of the Ketchikan M. Co., operating at Sea Level, Alaska.

JAS. ROSS, of Montreal, Canada, will be the future managing director of the Dominion Iron and Steel Co.

W. L. COBB, formerly assayer for Keystone Con. M. Co., has opened a custom assay office in Redding, Cal.

J. M. NOUGES JR., Supt. of the Josephine mine at Volcanville, Cal., is sojourning in San Francisco, Cal.

E. J. ROBERTS is reported to have succeeded Charles Sweney as manager Empire State-Idaho M. & Dev. Co.

W. H. HENDER has been appointed Supt. of the New York & Arizona C. M. & S. Co. mines, near Globe, Ariz.

J. T. MCCALL has returned to Michigan Bluff, Cal., from a two years' mining trip in the Philippines and Siberia.

CARL CLAUSEN, M. E., is the consulting mechanical engineer of the Greene Con. Copper Co., Cananea, Mexico.

T. E. KLECKNER, manager of the Hahn's Peak & Leadville M. & Inv. Co., at Columbine, Colo., is in New York.

THOS. N. SMITH, formerly of the Utica, Cal., mine, has returned to San Francisco from Urga, Touchetoukan, China, where

for the past eighteen months he had been in charge of the assay and gold purchase office of the Franco-Russian M. Co.

W. B. RYDER, late of Luning, Nev., has been appointed accountant at the Mount Shasta mine, near Shasta, Cal.

LOUIS AUERBACH, manager of the Trinity C. Co., is at the mine, near Kennett, in personal charge of operations.

H. A. SHIPMAN, Supt. of Stratton's Independence mine at Cripple Creek, Colo., is sojourning in Los Angeles, Cal.

W. S. McCORNICK, of Salt Lake City, Utah, has returned there from three years' mining in Siberia, in the Nertschinsk district.

R. HOLDEN, managing director of the Centennial Eureka M. Co. and United States M. Co., of Tintic, Utah, is sojourning in New York.

E. S. PORTER, of the U. S. Geological Survey, is in Lincoln county, Nev., making the Government statistical report on the mines of that district.

D. B. HUNTLEY, late manager of the DeLamar mine at DeLamar, Idaho, is in San Francisco for a few days, en route to Rhodesia, South Africa.

J. C. H. FERGUSON, Pacific coast agent Midvale Steel Co., has returned to San Francisco from Pennsylvania. After the 1st prox., his office will be at 220 Market St., San Francisco, Cal.

S. H. RIECHENBACH, managing director of the nickel mining corporation controlling the New Caledonia deposits of that metal, is in San Francisco, en route back to the island from Paris, France. He is accompanied by Major Robert G. Leckie, who is interested in the Sudbury, Ont., nickel mines.

#### Obituary.

CLARENCE KING, the most widely known geologist and mining engineer in the United States, died at Phoenix, Ariz., on December 22, of galloping consumption. For a number of years in the early '70s the deceased was connected with the U. S. Geological Survey. He did much of the early government work of the survey in the California mountains and on the 40th parallel. The story of his ascent of Mount Whitney, as he told it in "Mountaineering in the High Sierras," is one of the classics of California literature. It is more than a simple record of geology. So long as memory of the early years of California life—the years when the Gringo was making the land his own—so long as these memories remain, Clarence King's delightfully told story of Arcadian adventures will people the land of gold from the shades of the past. Clarence King's words will live to be the inspiration to high-aimed endeavor for many young geologists. The man himself, loved for a personality as charming as his writings, has gone forever, to the sincere sorrow and regret of a circle of friends as wide as his acquaintance among men.

#### Recently Declared Mining Dividends.

|                                                                             | Payable. |
|-----------------------------------------------------------------------------|----------|
| Ontario S. M. Co., Utah, 30 cents per share, \$45,000.....                  | Dec. 20  |
| Highland Boy M. Co., Utah, \$1.25 a share, \$375,000.....                   | Dec. 23  |
| Kendrick-Gelder Smelting Co., Colo., No. 2, 1 cent per share, \$10,000..... | Dec. 24  |
| Amalgamated Copper Co., \$1 per share, \$1,155,000.....                     | Jan. 1   |
| Consolidated M. Co., Colo., 10 cents per share, \$190,000.....              | Dec. 26  |
| Gold Coin M. Co., Colo., monthly, 3 cents per share, \$30,000.....          | Dec. 20  |
| New Zealand M. Co., Colo., monthly, 1 cent per share, \$9000.....           | Dec. 20  |

#### New Patents.

DEWEY, STRONG & Co.'s SCIENTIFIC PRESS PATENT AGENCY, 330 Market St., S. F., has official reports of the following U. S. patents issued to Pacific coast inventors:

|                                                        |
|--------------------------------------------------------|
| 688,821.—RAILROAD BRAKE—W. H. Bates, Dixie, Wash.      |
| 689,106.—MINING—J. E. Coleman, Spokane, Wash.          |
| 689,167.—MINING—J. E. Coleman, Spokane, Wash.          |
| 689,088.—SWIMMING DEVICE—B. J. Hooper, Portland, Or.   |
| 689,190.—PROCESS—B. Hunt, S. F.                        |
| 689,040.—PROCESS—L. W. Johnson, Jerome, Ariz.          |
| 688,879.—MIXER BOX—B. H. Otis, Perris, Cal.            |
| 689,028.—BRACE FOR BUGGY TOPS—A. Seekt, Pullman, Wash. |
| 689,328.—CARTRIDGE CAPPER—A. Seidell, Arcata, Cal.     |
| 689,338.—TAPPING BUNG—H. Wendt, S. F.                  |

#### Commercial Paragraphs.

THE W. J. Clark Co. of Salem, Ohio, report a lively demand for their improved hose couplers, known as the "Quick as Wink." Their use on com-

pressed air hose in shops where pneumatic tools are used is said to work a great saving of time. The W. B. Pollock Co. of Youngstown, Ohio, having tried them in their extensive boiler works, have decided to discard the common coupler and use the "Quick as Wink" instead. Their order has been placed for 180 sets.

#### Latest Market Reports.

SAN FRANCISCO, Dec. 26, 1901.

SILVER.—Per oz., Troy: London, 25½d (standard ounce, 925 fine); New York, bar silver, 55½c (1000 fine); San Francisco, 55½c; Mexican dollars, 47c San Francisco, 43½c New York.

COPPER.—New York: Lake, 1 to 3 casks, \$13.40; carload lots, \$13.00; Electrolytic, 1 to 3 casks, \$13.00; carload lots, \$12.87; Casting, 1 to 3 casks, \$12.60; carload lots, \$12.50. San Francisco: \$15.15. Mill copper plates, \$17.15; bars, 26¢/20c. London: £48 10s per ton.

LEAD.—New York, \$4.00; Salt Lake City, \$3.50; St. Louis, \$4.00; San Francisco \$4.50. carload lots; 4½c 1000 to 4000 lbs.; pipe 5½, sheet 6, bar 5½c; pig, \$4.75. London, £10 3s 9d per ton = 2.24 cents per lb.

SPELTER.—New York, \$4.20; St. Louis, \$3.75; London, £16 2s 6d per ton = 3.58¢ cts. per lb.; San Francisco, ton lots, 5c; 100-lb. lots, 5½c.

ANTIMONY.—New York, Cookson's, 10c; Hallett's, 9c; San Francisco, 1000-lb. lots, 10c; 300 to 500 lbs., 11c; 100-lb. lots, 13¢/15c.

IRON.—Pittsburg, Bessemer pig, \$16.50; gray forge, \$14.00; San Francisco, bar, 2.60c per lb., 2.65c in small quantities.

STEEL.—Bessemer billets, Pittsburg, \$24; open hearth billets, \$26.50; San Francisco, bar, 7c to 12c per lb.

NICKEL.—New York, 50¢/60c per lb. TIN.—New York, pig, \$27.50; San Francisco, ton lots, 27c; 1000 lbs., 27½c; 500 lbs., 27½c; 200 lbs., 27½c; less, 28c; bar tin, \$32½c.

PLATINUM.—San Francisco, crude, \$19 ½ oz.; New York, \$20.50 per Troy oz. BISMUTH.—New York, \$2.25 50-lb. lots; San Francisco, \$2.50 to \$2.75 lb. lots.

QUICKSILVER.—New York, \$51.00 large lots; London, £9 2s 6d; San Francisco, local, \$48.00 per flask of 70½ lbs.; Export, \$45.00.

MAGNESIUM.—New York, \$2.90 per lb.; San Francisco, \$3.75.

ZINC.—San Francisco, 5½c; slab, 5½c; bar, 7c; zinc dust, N. Y., 8c.

BABBITT METAL.—San Francisco, No. 1, 10c.

ALUMINUM.—New York, No. 1, 99% pure ingots, 35c; No. 2, 90%, 30c to 35c.

SOLDER.—Half-and-half, 100-lb. lots, 18c; San Francisco, Plumbers', 100-lb. lots, 15.25c.

PHOSPHORUS.—F. o. b. New York 50¢/60c per lb.

FERRO-MANGANESE.—Pittsburg, 80%, domestic, \$58.50, large lots.

TUNGSTEN.—New York, \$9, 95c; San Francisco, \$1.15.

FERRO-TUNGSTEN.—New York, 37%, 32c; San Francisco, 65c (60%).

ASSAY LITHARGE.—San Francisco, 10c per lb., small lots.

POWDER.—F. o. b. San Francisco: No. 1, 70% nitro-glycerine, per lb., in carload lots, 15½c; less than one ton, 17½c. No. 1\*, 60%, carload lots, 13½c; less than one ton, 15½c. No. 1\*\* 50%, carload lots, 11½c; less than one ton, 13½c. No. 2, 40%, carload lots, 10c; less than one ton, 12c. No. 2\* 35%, carload lots, 9½c; less than one ton, 11½c. No. 2\*\* 30%, carload lots, 9c; less than one ton, 11c. Black blasting powder in carload lots, minimum car 728 kegs, \$1.50 per keg; less car lots, \$2 per keg.

CAPS.—3x, \$5.50 per 1000; 4x, \$6.50; 5x, \$8; Lion, \$9, in lots not less than 1000.

FUSE.—Triple tape, \$3.60 per 1000 feet; double tape, \$3.00; single tape, \$2.65; Hemp, \$2.10; Cement No. 2, \$3.00; Cement No. 1, \$2.65, in lots of 3000 feet and up.

CANDLES.—Granite 6s, 16 oz., 40s., 10c per set; 14 oz., 40s., 9c.

CHEMICALS.—Cyanide of potassium, 98%—99%, jobbing, 30¢/31c per lb.; carloads, 28¢/29c; in 10-lb. tins, 40c; sulphuric acid, in carboys, 66% B, 2c per lb.; soda ash, \$1.90 per 100 lbs.; hyposulphite of soda, 2½¢/3c per lb.; blue vitriol, 5½¢/6c per lb.; borax, concentrated, 7¢/8c per lb.; chlorate of potash, 12¢/13c; red sulphur, 6c; alum, \$1.90/2.00; flour sulphur, French, 2½¢/2c; California refined, 1½¢/2c; nitric acid, in carboys, 8c per lb.; caustic soda, in drums, 3¢/4c per lb.; Cal. s. soda, bbls., \$1.00; ska, 95c per 100 lbs.; chloride of lime, spot, \$2.50/2.60; nitrate of potash, in kegs, 8c; caustic potash, 10c in 40-lb. tins.

COAL.—San Francisco, coast, yard prices: Wellington, \$9; Seattle, \$7.00; Coos Bay, \$5.50; Southfield, \$9.00. Cargo lots, Eastern and foreign: Wallend, \$8.00; Brymbo, \$7.50; Pennsylvania, hd., \$14.00; Scotch, \$8; Cumberland, \$12; Cannel, \$9.50; Welsh Anthracite, \$12.00; Rock Springs, \$8.50; Colorado Anthracite, \$14.50. Coke, \$16 per ton in bulk; \$18 in sacks.



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| Union Gas Engine Co.                          | 10          |                                 |             |                      |    |                             |    |
| Union Iron Works                              | 4           |                                 |             |                      |    | </                          |    |



## ASSESSMENT NOTICES.

**INYO MARBLE COMPANY OF CALIFORNIA.**—Location of principal place of business, San Francisco, California; location of works, Inyo, Inyo County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 19th day of November, 1901, an assessment (No. 35) of five (5) cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, room 31, tenth floor, Mills Building, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 15th day of January, 1902, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 11th day of February, 1902, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

CHARLES E. ANDERSON, Secretary.  
Office—Room 31, tenth floor, Mills Building, San Francisco, California.

**MARINA MARICANO GOLD MINING COMPANY.**—Location of principal place of business, San Francisco, California; location of works, Sunny Hill, Shasta County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 4th day of December, 1901, an assessment (No. 26) of four cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin to the secretary, at the office of the company, 217 Sacramento street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 6th day of January, 1902, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 27th day of January, 1902, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

CHAS. BOVONE, Secretary.  
Office—217 Sacramento street, San Francisco, California.

**BUDDLEY MINING COMPANY.**—Location of principal place of business, San Francisco, California; location of works, Bodie, Mono County, California.

Notice is hereby given, that, at a meeting of the Board of Directors, held on the 11th day of December, 1901, an assessment (No. 13) of two (2) cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin to the secretary, at the office of the company, room 60, No. 300 Montgomery street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 18th day of January, 1902, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on TUESDAY, the 4th day of February, 1902, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

J. STADTFELD JR., Secretary.  
Office—Room 56 No. 3.9 Montgomery street, San Francisco, California.

**YUBA CONSOLIDATED GOLD MINING COMPANY.**—Location of principal place of business, San Francisco, California; location of works, Nevada County, California.

Notice is hereby given, that, at a meeting of the Board of Directors, held on the 17th day of December, 1901, an assessment (No. 5) of three cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin to the secretary, at the office of the company, room 184, 9th floor, Crocker Building, corner of Post and Market streets, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 27th day of January, 1902, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 17th day of February, 1902, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

EDWARD H. STEARNS, Secretary.  
Office—Room 184, Crocker Building, San Francisco, California.

**GARIBALDI MINING COMPANY.**—LOCATION OF principal place of business, San Francisco, California; location of works, Mariposa County, California.

Notice is hereby given, that, at a meeting of the Board of Directors, held on the 6th day of December, 1901, an assessment (No. 1) of one and one-half (1½) cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, Room 18, 530 California street, San Francisco, California.

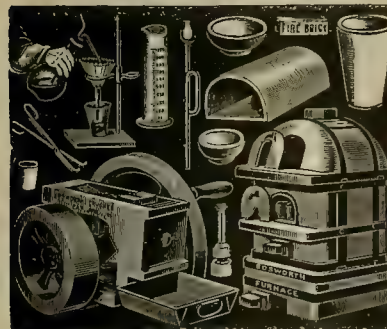
Any stock upon which this assessment shall remain unpaid on the 21st day of January, 1902, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on SATURDAY, the 15th day of February, 1902, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

R. L. CHENEY, Secretary.  
Office—Room 18, 530 California street, San Francisco, California.

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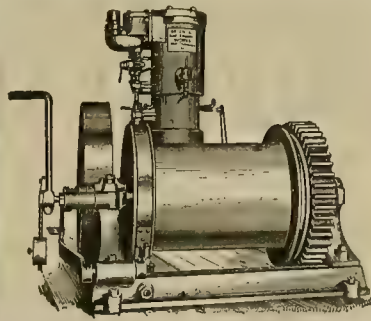
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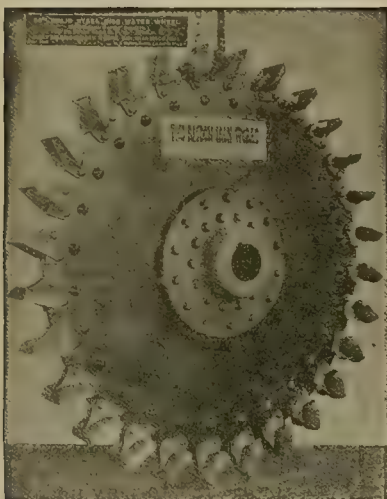
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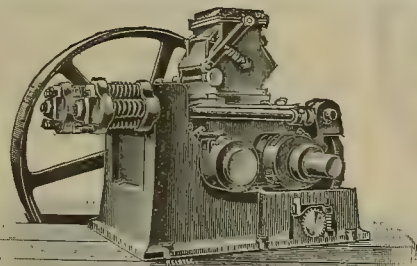
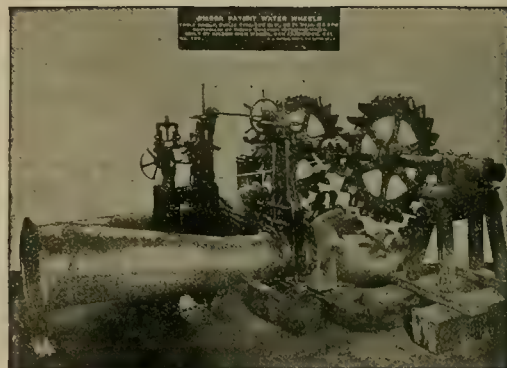
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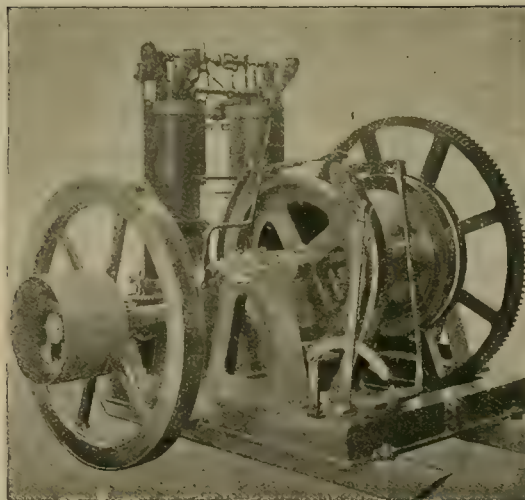
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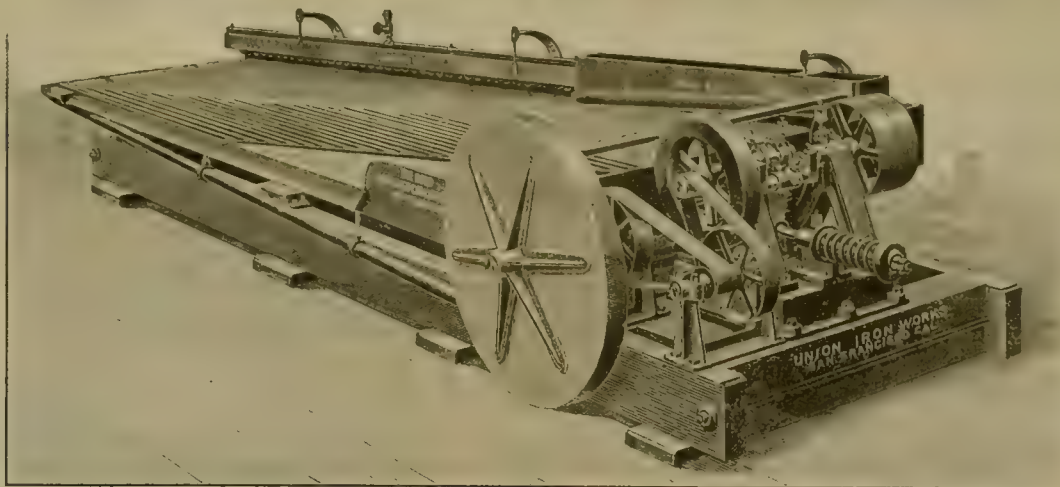
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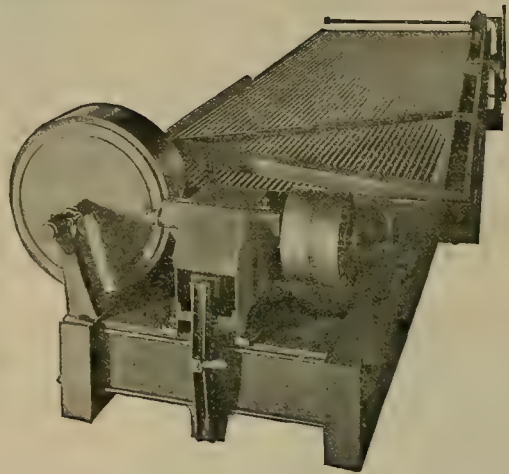
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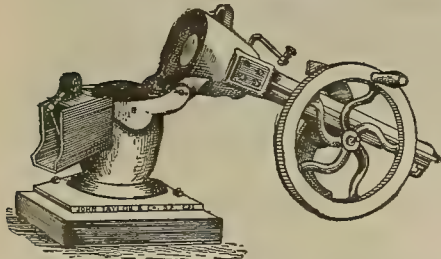


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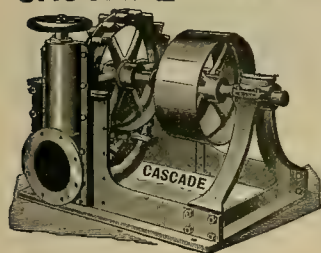


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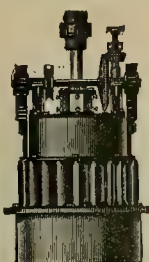
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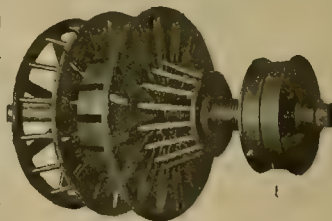
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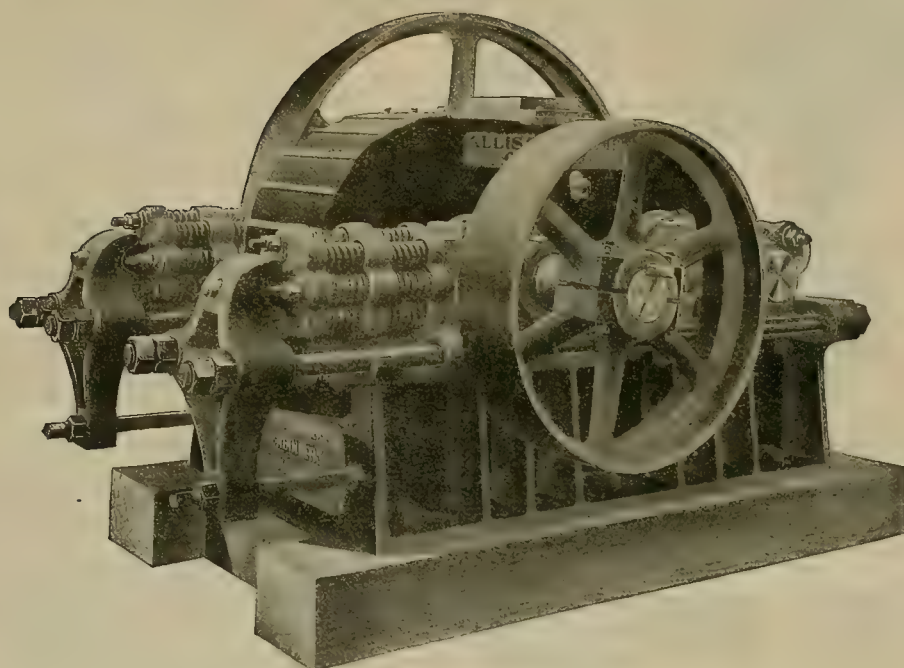
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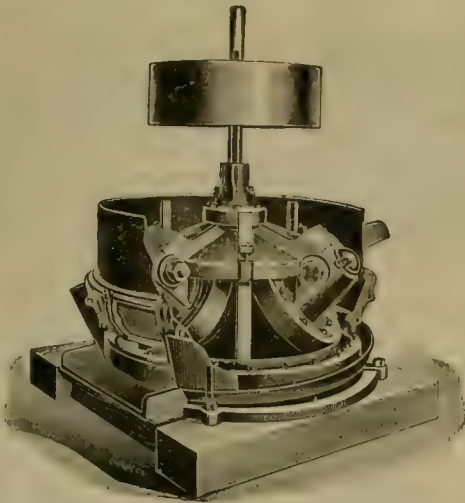
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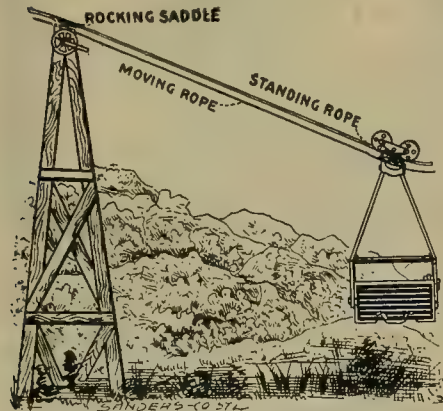
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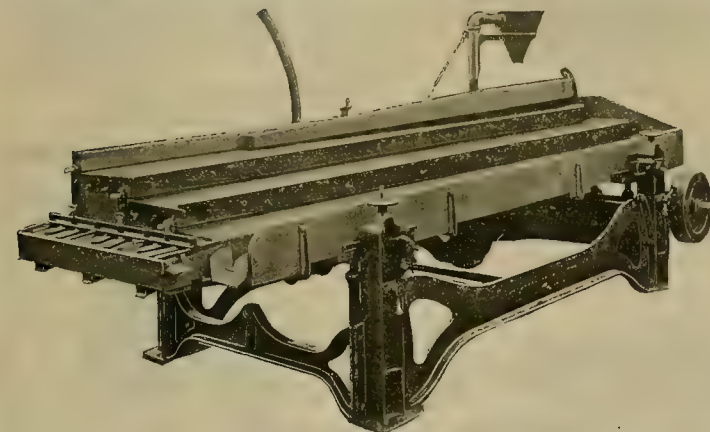
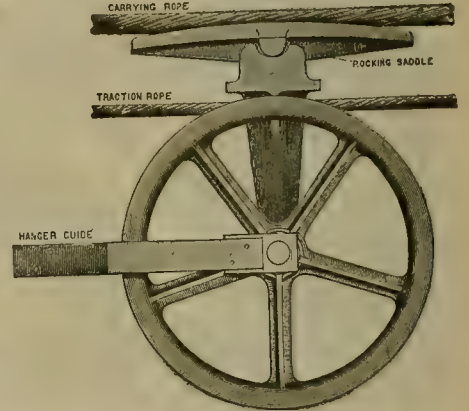
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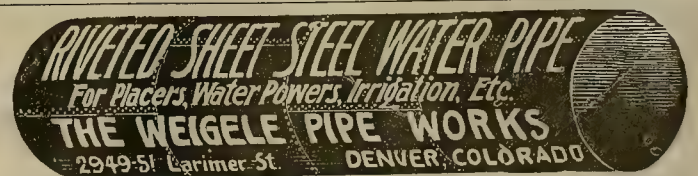
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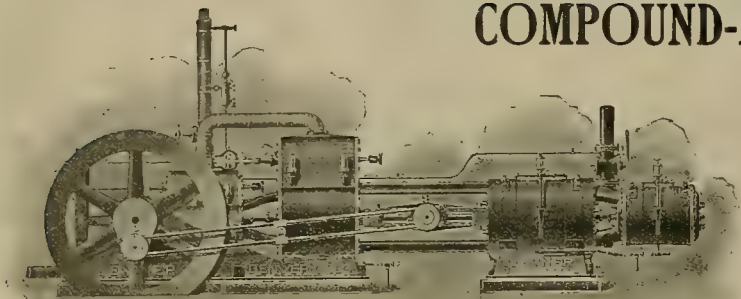


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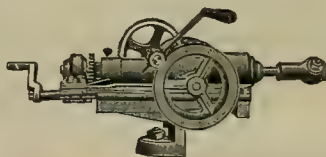
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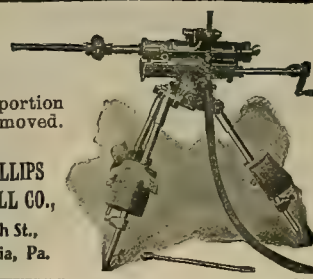
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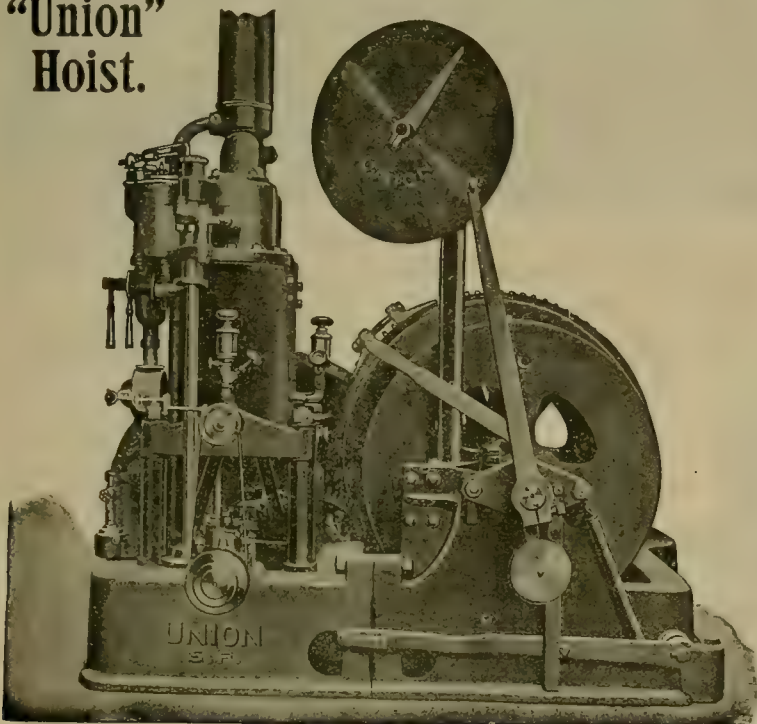
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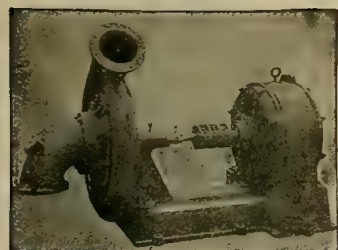
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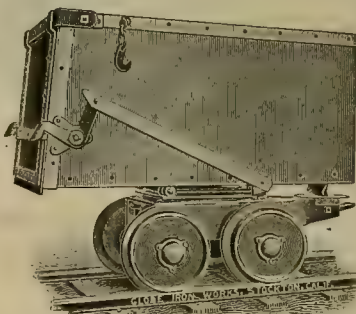
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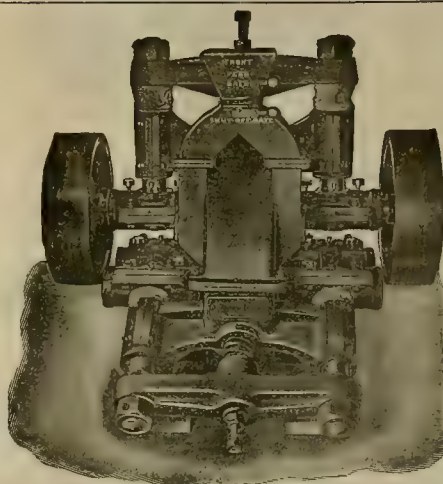
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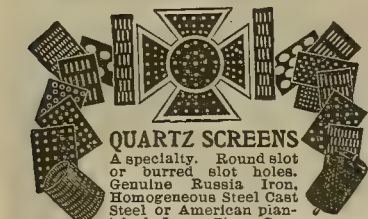


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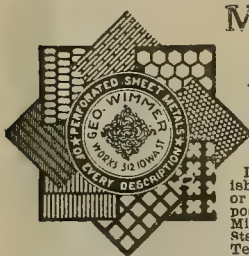
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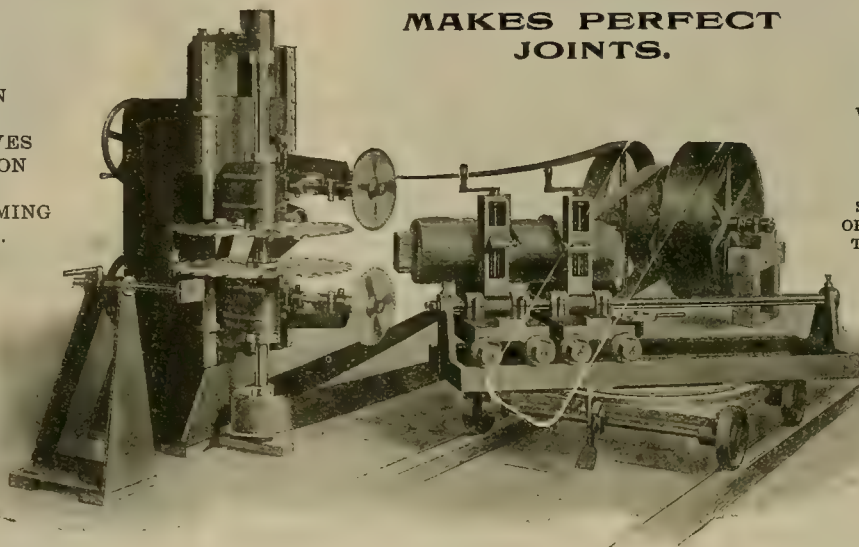


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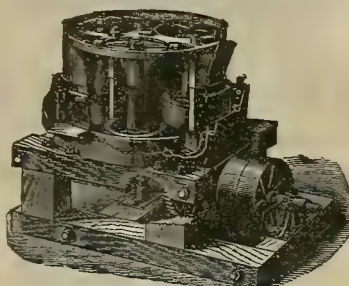
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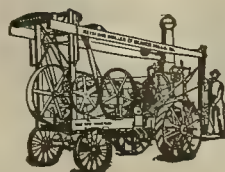
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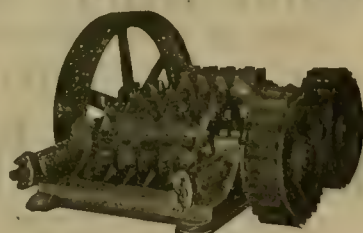
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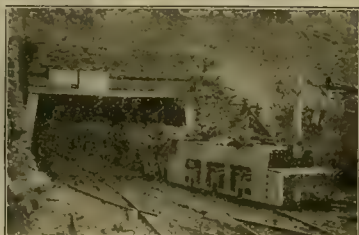
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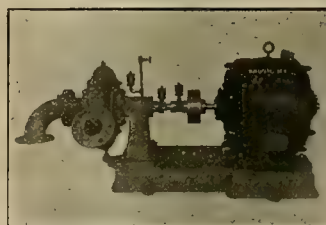
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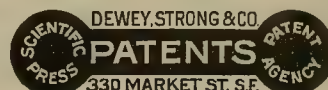
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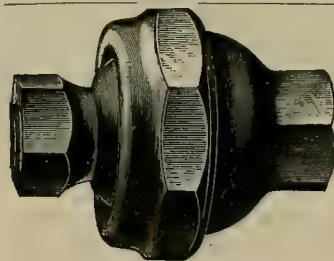
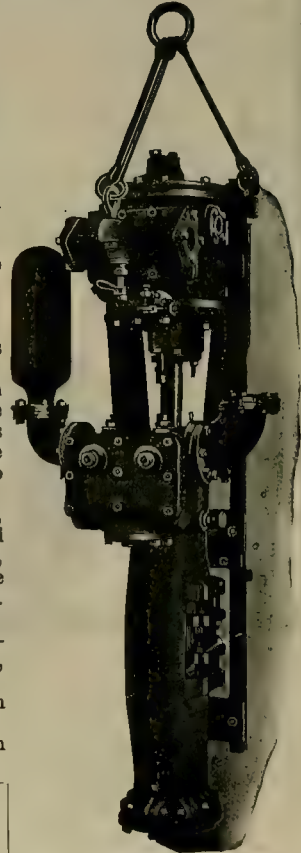
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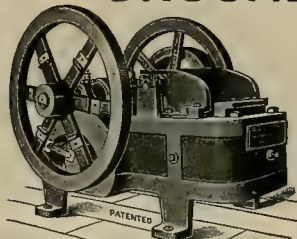
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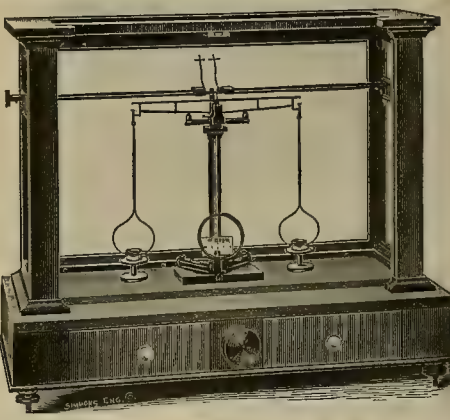
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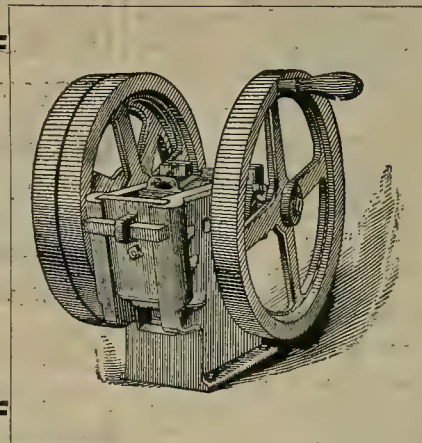
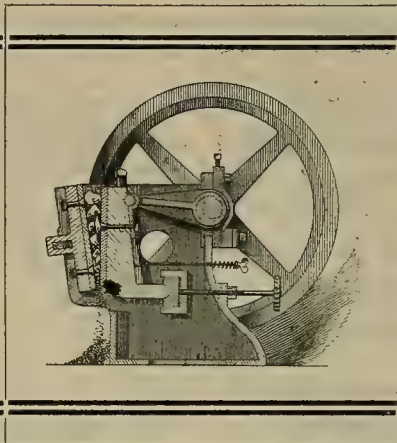
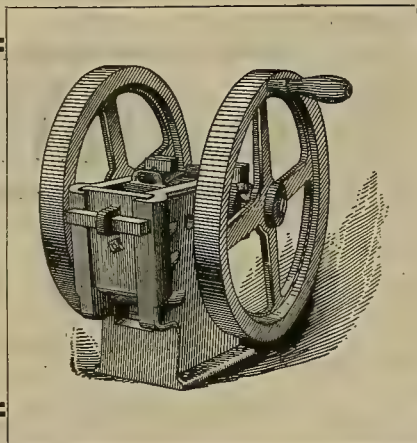


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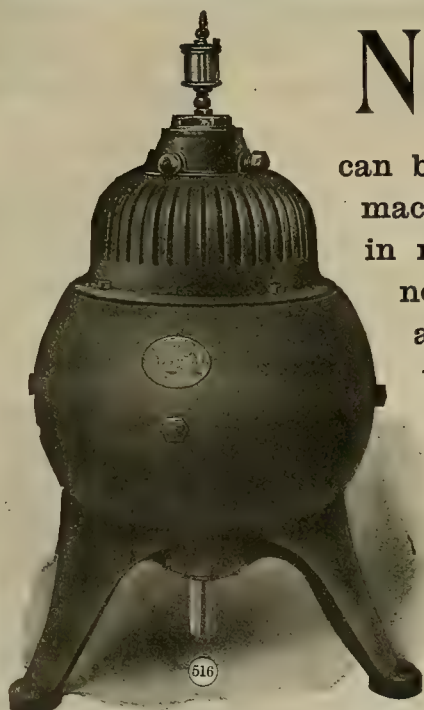


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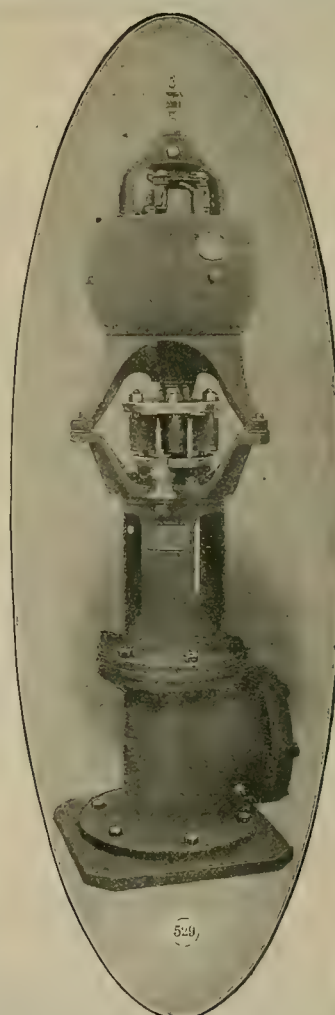
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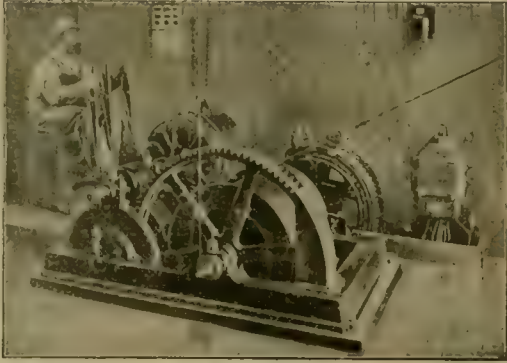
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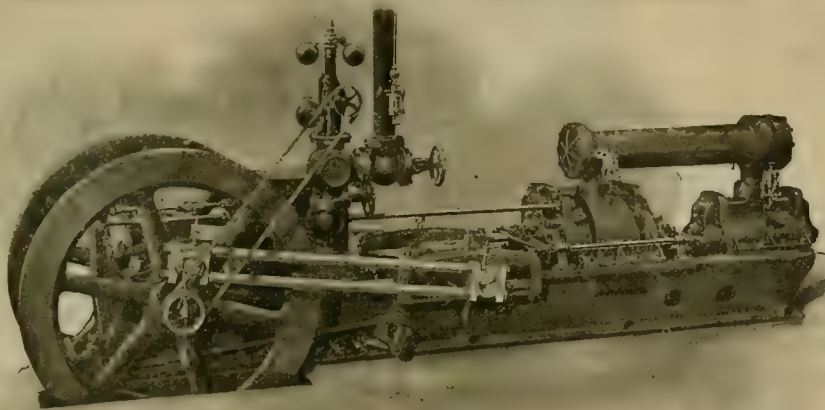
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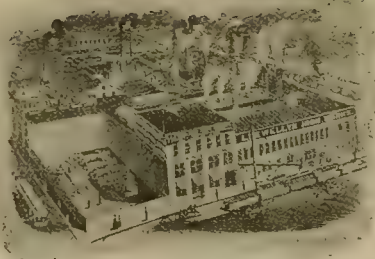
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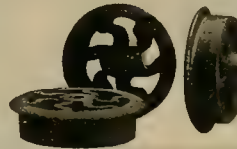
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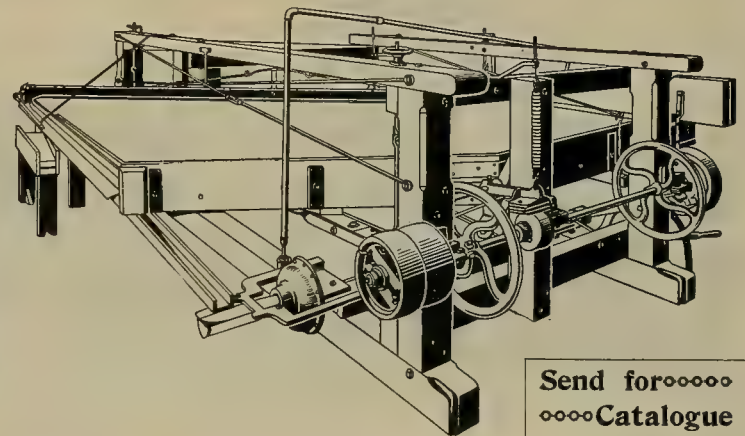
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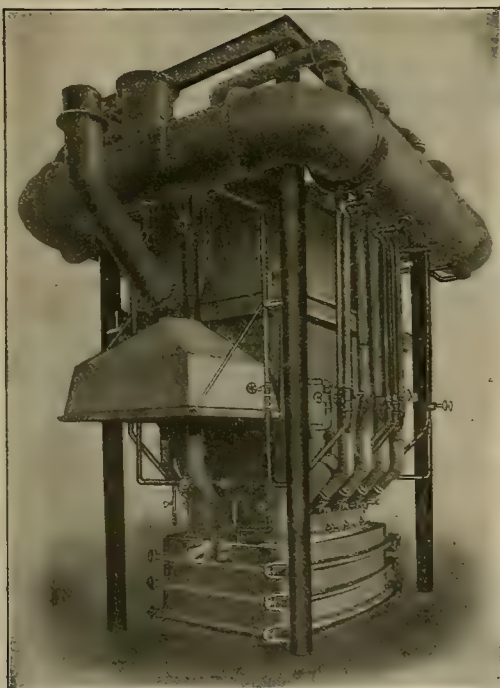
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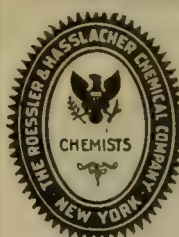
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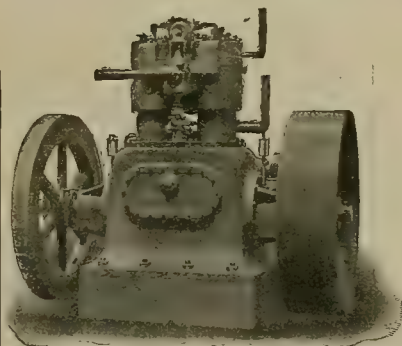
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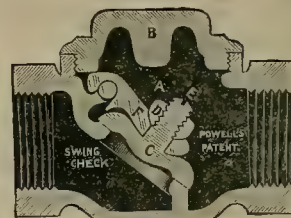
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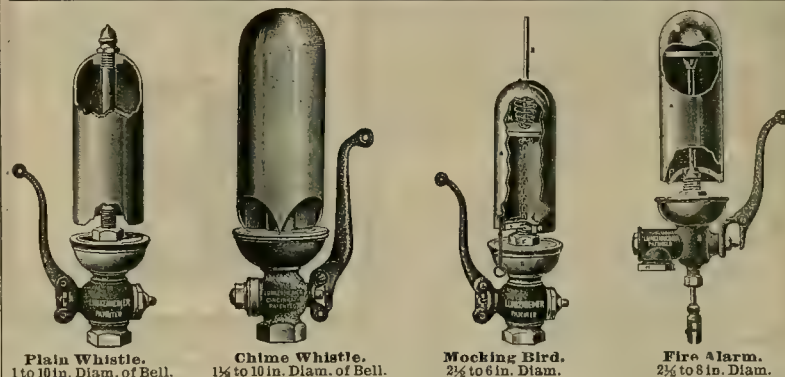


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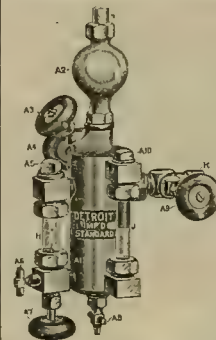
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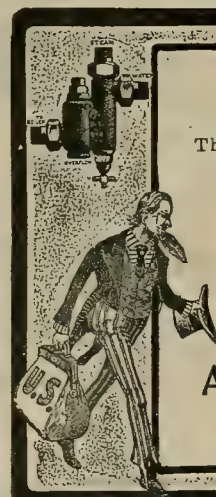
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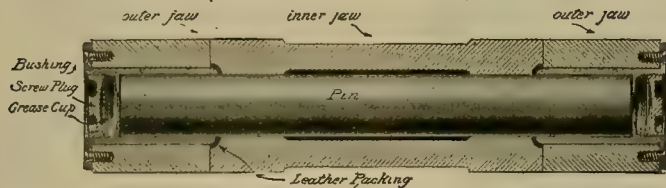
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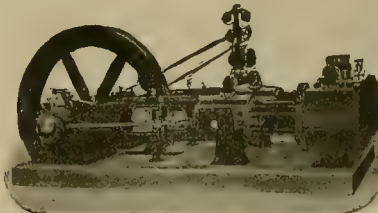
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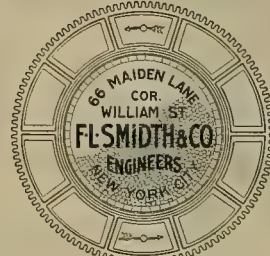
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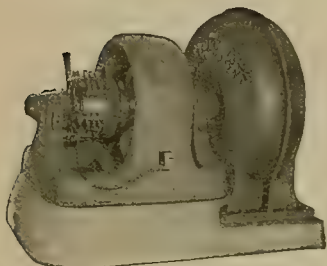
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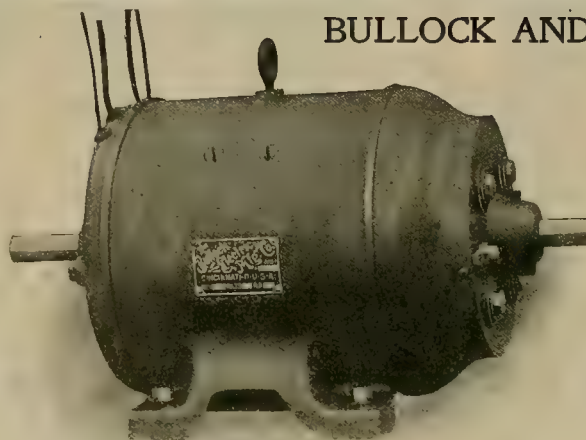
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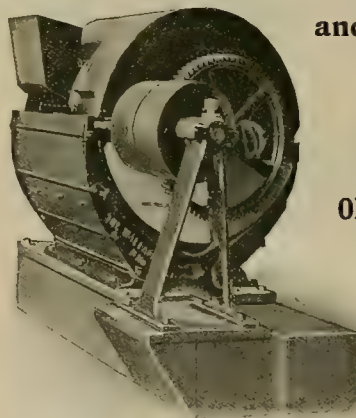
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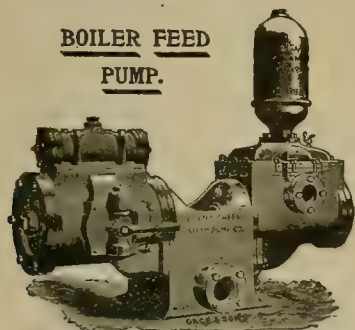
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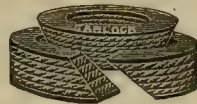
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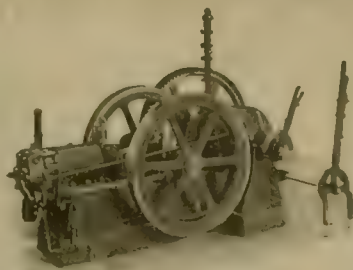
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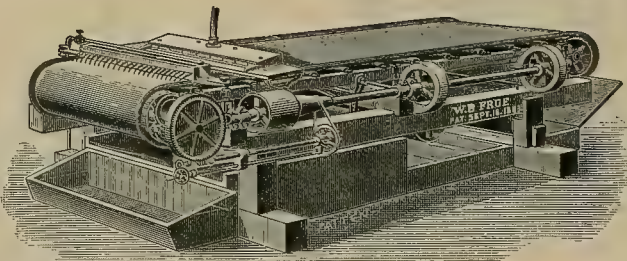
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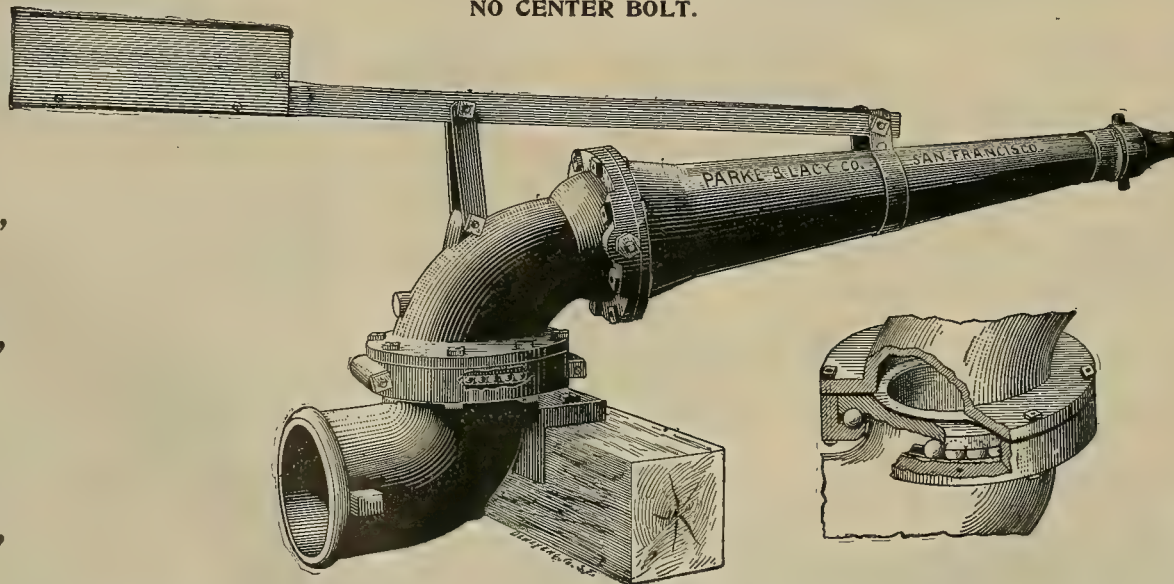
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